



National Aeronautics and
Space Administration

NASA-CR-184013
19910005807

MHR-15

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Chronology: MSFC Space Shuttle Program

Development, Assembly, and Testing Major Events (1969 – April 1981) (December 1988)

Compiled by:
Management Operations Office
Contract NAS8-35900

RECEIVED

AUG 15 1989

LANGLEY RESEARCH CENTER
LIBRARY NASA
HAMPTON, VIRGINIA



NF00234

d 91n15120

DISPLAY 91N15120/2

91N15120*# ISSUE 6 PAGE 933 CATEGORY 99 RPT#: NASA-CR-184013 NAS
1.26:184013 MHR-15 CNT#: NAS8-35900 88/12/00 190 PAGES UNCLASSIFIED
DOCUMENT

UTTL: Chronology: MSFC Space Shuttle program development, assembly, and testing
major events (1969 - April, 1981)

AUTH: A/WHALEN, JESSIE E.; B/MCKINLEY, SARAH L.; C/GATES, THOMAS G. PAT:
A/comp.; B/comp.; C/comp.

CORP: Management Services, Inc., Huntsville, AL.

SAP: Avail: NTIS HC/MF A09

CIO: UNITED STATES

MAJS: /*CHRONOLOGY/*HISTORIES/*NASA PROGRAMS/*RESEARCH FACILITIES/*SPACE
SHUTTLES/*SPACE STATIONS/*TEST FACILITIES

MINS: / RESEARCH PROJECTS/ SPACE PROGRAMS

ABA: Author

ABS: Listings of major events directly related to the Space Shuttle Program at
Marshall Space Flight Center (MSFC) are presented. This information will
provide the researcher with a means of following the chronological
progression of the program. The products that the historians have prepared
are intended to provide supportive research essential to the writing of
formal narrative histories of Marshall's contributions to the Space
Shuttle and Space Station.

ENTER:

FOREWORD

The Marshall Space Flight Center maintains an active history program to assure that the foundation of the Center's history is captured and preserved for current and future generations. As part of that overall effort, the Center began a project in 1987 to capture historical information and documentation on the Marshall Center's roles regarding Space Shuttle and Space Station.

Working under Contract NAS8-35900, three historians employed by MSI, a Division of the Bionetics Corporation, began compiling bibliographies, chronologies and oral interview transcripts. MSI historians Jessie E. Whalen and Sarah L. McKinley did the work for Space Shuttle while historian Thomas G. Gates did the work for Space Station.

The products that the historians have prepared are intended to provide supportive research essential to the writing of formal narrative histories of Marshall's contributions to the Space Shuttle and Space Station. The products will also help ensure that historically significant facets of Marshall's involvement in both programs are not overlooked or lost, whether they be in the form of events, documents, or personal interviews.

This supportive research is that which is basic to any historical research project and is not intended to be an end unto itself. It is designed to give the historian the necessary data from which to compile the aforementioned written histories and to preserve records of historically significant aspects of Marshall's involvement in Space Shuttle and Space Station.

This document is Marshall History Report 15 (MHR-15), **Chronology: MSFC Space Shuttle Program Development, Assembly, and Testing Major Events (1969-April 1981)**. It contains listings of major events directly related to the Space Shuttle Program at Marshall. This information will provide the researcher with a means of following the chronological progression of the program.

Questions concerning this document should be directed to the Marshall Space Flight Center Historian, CN22, Marshall Space Flight Center, Alabama 35812.

PREFACE

The Space Shuttle History Project is on-going; therefore, the following **Chronology** will be updated and amended continually. If there appear to be gaps or omissions in this **Chronology**, they should be rectified as research continues.

The body of this document contains synopses of major events listed according to the dates of their occurrence. Indices follow the synopses and provide additional data. The **Event Index** provides a brief listing of all the events without synopses. The **Component Index** lists the specific components of the Space Shuttle Program under consideration in the events. The **Location Index** lists the locations where the events took place.

Although the body of this **Chronology** is comprised of events which occurred from 1969 through April 1981, **Appendix C** contains a listing of major Space Shuttle Program events prior to 1969. **Appendix A** contains an abridged listing of significant milestones in the Shuttle Program. **Appendix B** contains a listing of major Space Shuttle contracts.

Acronyms and abbreviations used in this **Chronology** follow the forms of those listed in NASA Reference Publication 1059 Revised, **Space Transportation System and Associated Payloads: Glossary, Acronyms, and Abbreviations**. Abbreviations of source titles are included in the **List of Source Abbreviations** found at the beginning of the **Chronology**.

LIST OF SOURCE ABBREVIATIONS

A&A	<u>Astronautics and Aeronautics: A Chronology.</u> NASA Headquarters Scientific and Technical Information Branch.
HSV-TIMES	<u>The Huntsville Times.</u> Newhouse Newspapers, Huntsville, Alabama.
MSFC-Ill-Chron	<u>An Illustrated Chronology of the NASA Marshall Center and MSEC Programs, 1960-1973.</u> U.S. Government Printing Office.
MSFC-Rel	MSFC Release. Marshall Space Flight Center Public Affairs Office.
M-STAR	<u>Marshall Star.</u> Marshall Space Flight Center Public Affairs Office.
NASA-Rel	NASA Release. NASA Headquarters Office of Communications.
NHDB	<u>NASA Historical Data Book.</u> Vol. 1. NASA Headquarters Scientific and Technical Information Division.
RIC-Chron	<u>Space Transportation System Background Information: Space Shuttle Chronology.</u> Rockwell International Corporation.
Rice-Chron	<u>The Development of the Space Transportation System from Its Earliest Beginnings Through Letter Contract Finalization: A Chronology.</u> Center for the History of Leadership Institutions.
SPCFLT	<u>Spaceflight: A Publication of the British Interplanetary Society.</u>
SSME/RKD-QRev	<u>SSME/RKD Quarterly Review, 9 April 1976.</u> Marshall Space Flight Center Shuttle Projects Office.

CONTENTS

FOREWORD

PREFACE

LIST OF SOURCE ABBREVIATIONS

CHRONOLOGY: MSFC SPACE SHUTTLE PROGRAM DEVELOPMENT, ASSEMBLY,
AND TESTING MAJOR EVENTS (1969- APRIL 1981)

APPENDIX A: MAJOR MILESTONE CHART

APPENDIX B: SPACE SHUTTLE CONTRACT TREE

APPENDIX C: PRE-DEVELOPMENT, ASSEMBLY, AND TESTING CHRONOLOGY
EVENT INDEX

LOCATION INDEX

COMPONENT INDEX

CHRONOLOGY

DATE	EVENT	SOURCE
69/01/31	NASA awarded four contracts each valued at \$500,000 to Lockheed (managed by MSFC), General Dynamics (managed by MSFC), North American Rockwell (managed by MSC), and McDonnell Douglas (managed originally by LaRC). Contractors were to conduct parallel studies of an Integral Launch and Reentry Vehicle (ILRV) to be concluded in September 1969. Lockheed and NAR were to examine cluster or modular reusable flyback stages and the latter expendable tank configurations. General Dynamics was to study the expendable tank concept and modular solid propellant stages. MDAC is to concentrate on "triamese" configurations and reusable flyback stages.	Rice-Chron
69/02/10	MSFC announced it would manage two recently awarded \$300,000 6-month contracts, one to Lockheed and one to General Dynamics, for conceptual study of a low-cost, manned logistics (space shuttle) system. Similar study contracts awarded to North American Rockwell and to MDAC would be managed by MSC and LaRC. ILRV studies would investigate aspects of a reusable transportation system for post-1974 use in support of proposed space stations.	A&A(1969)
69/04/03	Thomas D. Paine, formerly Acting Administrator, became official NASA Administrator.	Rice-Chron; A&A(1969)
69/04/05	The Space Shuttle Task Group (SSTG) was created at NASA Headquarters. The shuttle effort was headed by Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight. (Charles W. Mathews, Deputy Associate Administrator for Manned Space Flight, would head the Space Station effort. The Space Station Task Force was also formed at this time.) Heading up the SSTG, and reporting to Dr. Mueller, was LeRoy E. Day, former Director of Apollo Testing. The group was to develop NASA material for a report on space shuttles. NASA would work directly with DOD to provide an integrated report serving as the basis for the President's Task Group recommendations on space shuttles.	NASA-Rel-69-70
69/04/24	The SSTG held its first meeting. During the meeting both Dr. George E. Mueller and Charles Mathews stressed the relationship between the Space Shuttle and the Space Station. The question of using the Space Shuttle for short duration missions was discussed. Also, the SSTG addressed the impact of DOD payloads on the Shuttle.	Rice-Chron
69/05/05	Dr. George E. Mueller, Associate Administrator for Manned Space Flight, conducted a briefing for shuttle contractors. The purpose of the briefing was to notify the contractors of changes in design requirements. Dr. Mueller began the briefing by reminding the contractors that NASA and the Air Force were scheduled to make a joint report on the subject of low cost transportation to the President's Space Task Group on 15 June. Because of the limited time, Mueller requested that the contractors turn in their shuttle reports by 19 May.	Rice-Chron
69/06/12	NASA's Space Shuttle Task Group (SSTG) completed the final version of its SPACE SHUTTLE TASK GROUP REPORT. Volume I of the report was entitled MISSIONS. It gave "a general description of the mission and mission requirements that have been identified as being of major interest in NASA's future space program planning." The SSTG identified five criteria as constituting "the space shuttle baseline vehicle requirements." These requirements were 1) a 50,000-lb payload; 2) a crew of two; 3) a 10,000-cubic foot internal payload volume; 4) a 270-nmi orbit, 55-degree inclination; and 5) a seven day mission duration. The other three volumes were entitled DESIRED SYSTEMS CHARACTERISTICS, VEHICLE CONFIGURATIONS and PROGRAM PLANS.	Rice-Chron

DATE	EVENT	SOURCE
69/06/20	NASA issued a revised study plan for Phase A ILRV work with supplementary payment of \$150,000 to each of the four contractors. MDAC received an additional \$225,000 for analysis of the fully reusable concept. Lockheed, General Dynamics and NAR were also oriented towards this design approach.	SPCFLT-Vol.15-#6
69/06/26	The NASA SSTG released an additional volume of the SPACE SHUTTLE TASK GROUP REPORT. This volume, entitled TECHNOLOGY PROGRAM PLAN, was, in effect, an extension of Volume IV, PROGRAM PLANS, of the 12 June report. The volume was "to develop a plan at this time only for that work clearly recognized as critical for immediate implementation."	Rice-Chron
69/08/05	Dr. Thomas O. Paine, NASA Administrator, and other top NASA officials testified on future space programs before the Senate Committee on Aeronautical and Space Sciences. Dr. Paine introduced future programs. Included in the agency's future was the goal of manned planetary exploration. Dr. Wernher von Braun, MSFC Director, described a possible, 12-man, two-ship expedition to Mars by 1981-82. Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight, described NASA's plan to utilize the "concept of reusability" to improve and reduce the cost of operating in space. Reusability could be achieved "through the reuse of launch and space vehicles and...through the reuse of a mission module such as a space station."	A&A(1969)
69/09/11	Dr. George E. Mueller, Associate Administrator for Manned Space Flight, issued instructions that MSFC be given responsibility for shuttle auxiliary propulsion development. He did so in line with recommendations contained in a presentation by Jerry Thomson, MSFC, that MSC and MSFC were to share in the expenditure of \$1.8 million for this purpose. Thomson's presentation was given at a special meeting on shuttle technology following the Management Council Meeting.	Rice-Chron
69/09/15	The Space Task Group presented THE POST-APOLLO SPACE PROGRAM: DIRECTIONS FOR THE FUTURE to President Nixon. It recommended the basic goal of a balanced manned and unmanned space program conducted for all mankind, with emphasis on increased utilization of space capabilities for services to man through an expanded space applications program. The report recommended: the enhancement of the U.S. military posture for world peace and security through exploitation of space techniques for military missions; the continuation of a strong program of lunar and planetary exploration astronomy, physics, and earth and life sciences; the development of new systems and technology for space operations, emphasizing commonality, reusability, and economy through the development of new space transportation capability and space station modules; and the promotion of world community through programs of broad international participation and cooperation.	A&A(1969)
69/10/00	During October, NASA made two pivotal decisions concerning desired shuttle systems characteristics. These were to eliminate the Aerospike engine from further consideration in contractor Shuttle studies and delete the requirement for a powered go-around as an operational requirement. The powered go-around requirement was retained, however, for development.	Rice-Chron
69/10/03	MSC announced the appointment of Astronaut L. Gordon Cooper as Assistant to the Shuttle Program in MSC's Flight Crew Operations Directorate. Cooper would be responsible for the flight crew training program, astronaut inputs into design and engineering, and the directorate's part in hardware development and testing for space flight.	A&A(1969)

DATE	EVENT	SOURCE
69/10/18	A joint Air Force/NASA Design Criteria Review (DCR) identified evaluation criteria, established baseline systems characteristics for Phase B Space Shuttle development, and allocated action items among the various agencies involved.	Rice-Chron
69/11/10	NASA announced the resignation of Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight, effective 10 December. No replacement was named. Dr. Mueller, who had directed the Manned Space Flight program for 6 years, was a recipient of the NASA Distinguished Service Medal. Dr. Mueller achieved an early operational flight schedule in the Gemini Program and was a key figure in the Saturn/Apollo program. Dr. Mueller formulated low-cost space transportation operations programs which were the basis for both the Space Shuttle and Space Station programs.	A&A(1969)
69/12/01	Martin Marietta, Denver Division, submitted the final report of their Phase A study to NASA. Though accomplished as an inhouse effort not funded under NASA contract, the MMC study was conducted under ILRV guidelines and was coordinated with the MSFC Space Shuttle Task Group. The Martin Spacemaster vehicle which emerged from the study was a two-stage, fully reusable concept designed to the baseline 3.5 million-lb Gross Liftoff Weight (GLOW). Since the baseline GLOW restricted payload to 36,500 lbs, an alternate concept, sized to the baseline 50,000-lb payload, was considered as well. The most distinctive part of the Spacemaster concept was the double body flyback booster. The two bodies were joined together catamaran fashion by a canard stabilization surface which was fully enclosed by the fuselages and an aft lifting surface which extended well beyond them.	Rice-Chron
69/12/10	Dr. George E. Mueller resigned his post as Associate Administrator for Manned Space Flight. Dr. Mueller was head of the NASA Space Shuttle effort, specifically directing the SSTG. Dr. Mueller left to become Vice President of General Dynamics Corporation in New York City.	NASA-Rel-70-4
69/12/16	NASA established the Phase B Source Evaluation Board as part of the process for letting the Phase B Space Shuttle contracts.	Rice-Chron
70/01/00	In an article in AIAA's ASTRONAUTICS AND AERONAUTICS, Max Faget announced the superiority of the fully reusable two-stage aircraft as the best design for the Space Shuttle. "Although several others have been studied, this piggyback arrangement appears to provide the most straightforward staging with good provisions for launch load transmission between stages." Faget also stated that "no flight test would be made without sufficient evidence from previous history that the vehicle and crewmen would not be subjected to undue risk but also avoids excessive overdesign where margins are uncertain."	AIAA-A&A-Vol.8-No.1
70/01/12	Dale D. Myers, Vice President and General Manager of the Space Shuttle Program at North American Rockwell, became NASA Associate Administrator for Manned Space Flight. Myers replaced Dr. George E. Mueller who left the agency to become Vice President of General Dynamics. Myers would be responsible for the planning, direction, execution, and evaluation of NASA's overall MSF Program. These functions included management authority over MSFC, MSC, and KSC.	NASA-Rel-70-4
70/01/16	MSFC and MSC reached a decision concerning the division of responsibilities between the two centers on the development of auxiliary propulsion systems for the Shuttle. In the terms of a memorandum of understanding between the two centers, signed by the two center associate directors, MSFC was to issue the RFP	Rice-Chron

DATE	EVENT	SOURCE
70/01/16	to industry based on a joint MSC/MSFC procurement plan. The SEB was to consist of four MSFC (including the chair) and three MSC members. The memo anticipated that two development contracts would be let--one for a high pressure system and one for a low pressure system. MSC was to negotiate with their choice of selected contractors for the low-pressure systems study. MSFC was to negotiate with the "selected low pressure systems contractor not chosen by MSC." The process was reversed for the high-pressure system. Each center was to negotiate its own contracts. The MSFC Director was to serve as Source Selection Official.	
70/02/05	MSFC announced the award of separate \$150,000 3-month contracts to three firms to study possible conversion of 12 existing rocket engine test stands for captive firings of propulsion system for the new SSME. The new engine, not yet under development, would be used in clusters to power the Shuttle. Four test stands at MSFC would be studied by Aerojet General; four stands at NASA's Rocket Engine Test Site at Edwards, CA, by NAR Rocketdyne; and four at MTF, by UAC Pratt & Whitney.	A&A(1970)
70/02/12	House Committee on Science and Astronautics' Subcommittee on NASA Oversight released MANNED SPACE FLIGHT: PRESENT AND FUTURE. Staff study concluded that the growth of the space program in the past decade had "provided major national technological and scientific resource of personnel and facilities." Decline in resources could increase risk in accomplishing current programs and was causing "dislocations in affected communities throughout the US."	A&A(1970)
70/02/18	NASA issued RFPs for preliminary definition and planning studies for the Shuttle main propulsion system. Preliminary concepts called for a cluster of throttlable engines with 1780 kilonewtons (400,000 lb) of thrust each at sea level. NAR Rocketdyne, Pratt & Whitney, Aerojet General, TRW, Bell Aerospace, and Marquardt were to submit their proposals by 20 March. Three firms would be awarded fixed-price contracts for 11-month parallel studies.	A&A(1970)
	NASA issued the Space Shuttle Phase B RFP. The RFP contained both classified and unclassified appendices. The RFP included a "Phase B Shuttle Management Plan" chart that graphically demonstrated the system of management that NASA was going to use with the Phase B contracts. While confirming that MSC and MSFC would each have "contractual responsibility for one or more total systems studies" of the Space Shuttle, the RFP further indicated that these two centers would each have technical direction of that portion of all contracts let that later would become the focus of each center's responsibility in Phase C/D.	Rice-Chron
70/03/00	The Space Shuttle Program Office within the Office of Manned Space Flight was established during March.	SPCFLT-Vol.15-#6; NHDB-Vol.3
70/03/19	TRW, in association with Garrett Corporation's Air Research Division, delivered a proposal to NASA for a definition study of the Shuttle's auxiliary propulsion system.	SPCFLT-Vol.15-#6
70/03/30	NASA convened the Source Evaluation Board for selection of Phase B Shuttle contractors. MDAC and NAR submitted their Phase B proposals to the board for consideration. NAR's proposal included three baseline configurations to be studied. MDAC's proposal included two baseline configurations for the Space Shuttle.	Rice-Chron
70/04/30	The MARSHALL STAR announced that NASA had selected three aerospace firms	Rice-Chron; A&A(1970)

DATE	EVENT	SOURCE
70/04/30	for final negotiations of parallel 11-month Phase B design and definition study contracts for the SSME. Studies would be managed by MSFC. The three firms were Aerojet, NAR Rocketdyne, and UAC Pratt and Whitney. The value of each contract was estimated at \$6 million. The unsuccessful bidders were Bell Aerospace, Marquardt, and TRW.	
70/05/04	The one-tenth scale model of the MSC 12,500-lb payload straight wing orbiter was successfully drop tested at Fort Hood, TX, under the supervision of the Operational Test Branch of the Landing and recovery Division. This was in anticipation of full testing at White Sands Missile Range later in the month.	Rice-Chron
70/05/06	The MARSHALL STAR announced that Lockheed, McDonnell Douglas, and North American Rockwell, Space Division, had submitted proposals for continuation of nuclear Shuttle definition studies. The proposals were being evaluated at MSFC. The proposed contract extensions would be for a 12-month duration including a period for documentation of the final study results.	M-STAR-05/06/70
70/05/12	NASA selected MDAC and NAR Space Division to negotiate 11-month, \$8 million, fixed-price contracts for parallel definition and preliminary design studies of a two-stage reusable Space Shuttle vehicle to transport crew, passengers, and cargo between earth and near space. MSFC would manage MDAC work and MSC would manage NAR work.	A&A(1970)
70/05/19	The MSC Shuttle Program Office held the first Space Shuttle Program management meeting with the Phase B contracting team of North American Rockwell and General Dynamics. MSC had responsibility for the contracts.	Rice-Chron
70/05/22	MSFC announced the award of three contracts for continuation of the nuclear shuttle definition series: \$343,000 to MDAC for a completely modular concept with an earth-to-orbit shuttle to transport modules for in-space assembly; \$245,000 to NAR Space Division for a nuclear stage 10 m (33 ft) in diameter to be orbited by Saturn V and refueled by an earth-to-orbit shuttle; and \$282,000 to Lockheed for both types.	A&A(1970)
70/05/26	MSFC Advanced Systems Analysis Office was investigating possible uses of the space tug, MSFC announced. The only space vehicle that would work with and connect all existing and future vehicles and systems, the space tug would first be used as a link between the Space Shuttle and the Space Station to taxi cargo and passengers in earth orbit. Both MSFC and MSC were working to develop space tug plans.	A&A(1970)
	MSFC announced the selection of MDAC and TRW for final negotiations leading to four contracts (two per company) totaling \$1.2 million for Space Shuttle auxiliary propulsion system definition.	A&A(1970)
70/05/27	A one-tenth model of the MSC straight wing, 12,500-lb payload orbiter was dropped from a CH-54 helicopter at the White Sands Missile Range as part of a series of stability and configuration demonstration tests. The model was 13 feet long and weighed 600 lbs. The drop was made from a hover at 12,000 feet. Following pitchover, the test vehicle entered a "slow roll to the right which rapidly diverged into a spiral dive." White Sands recommended that "the wing should incorporate devices to ensure flow separation at the root prior to tip stall to avoid the radical rolling moments and consequent roll divergence caused by simultaneous separation of flow over the entire wing on approach to stall."	Rice-Chron

DATE	EVENT	SOURCE
70/05/27	The test was described as a "limited success."	
70/06/07	The American Astronautical Society held its 16th annual meeting in Anaheim, CA. SSME Manager Francis M. Stewart and Ryndal L. Wetherington, Headquarters Shuttle Propulsion Manager, presented a paper on main propulsion requirements for a fully reusable SSME concept and new approaches to engine development and testing. Throttling to only 50% thrust satisfied the system's needs and was the baseline requirement. Value of one second of specific impulse had been calculated at \$25,000,000. Payload sensitivity of Shuttle concepts under study was 6900-8900 newtons (1500-2000 lbs per sec) of impulse. Minimum impulse per second in basic requirements represented 96% efficiency, "which has not been achieved in any rocket engine to date."	A&A(1970)
70/06/09	The one-tenth scale model of the MSC straight wing, 12,500-lb payload orbiter underwent a second successful drop test at White Sands Missile Range. The vehicle was dropped from an Army CH-54 helicopter in a hover at 13,930 feet. The transition maneuver was "nominal with the exception of a very slight roll attitude induced at pitch-over." No wing stall was encountered after pitch over.	Rice-Chron
70/06/15	MSC and MSFC released the SPACE SHUTTLE SYSTEM LEVEL II REQUIREMENTS for internal review and approval. The joint document was approved by Roy E. Godfrey, MSFC Space Shuttle Team Manager, and Robert F. Thompson, MSC Space Shuttle Program Manager, on 26 June and 1 July respectively. It was ultimately released as a part of the STUDY CONTROL DOCUMENT, SPACE SHUTTLE SYSTEM PROGRAM DEFINITION (PHASE B).	Rice-Chron
	NASA announced it would negotiate with Grumman, Lockheed, and Chrysler for 11-month Phase A contracts to study Space Shuttle concepts. Boeing would be the major subcontractor to Grumman on a \$4-million contract for three Space Shuttle concepts: a stage-and-a-half reusable manned spacecraft with an onboard propulsion system and droppable tanks for supplementary propellants; a reusable orbiter with an expendable booster; a reusable first stage using existing J-2S engine technology, solid-propellant auxiliary boosters, and a reusable second-stage orbital shuttle with a J-2 engine. Lockheed's \$1-million fixed-price contract would define an alternate stage-and-a-half system including high and low cross-range designs. Chrysler would study a reusable vehicle capable of placing payload into earth orbit with single stage under a \$750,000 contract.	A&A(1970)
70/06/29	MSFC awarded MDAC a \$143,987 contract for Space Shuttle thermal protection panel work. The one-year contract called for McDonnell Douglas to establish the requirements and procedures for field repair of Space Shuttle thermal protection panels. The firm would: identify various probable causes of damage that would require panel repair or replacement; develop methods for field repair of silicide-coated columbium panels; build two test panels for each repair method; and prepare a test plan.	M-STAR-07/15/70; MSFC-Rel-70-13
70/06/30	Dale D. Myers, Associate Administrator for Manned Space Flight, wrote Robert R. Gilruth, Director of MSC, giving official confirmation of Headquarters' intention to expand the scope of the Phase B contracts. Although MSC was directing the North American Rockwell contract and MSFC was directing the McDonnell Douglas contract, Headquarters gave MSFC responsibility for the added work for both companies.	Rice-Chron

DATE	EVENT	SOURCE
70/07/00	MDAC was awarded two separate auxiliary propulsion system study contracts. MSC awarded MDAC a contract to study low-pressure APS. MSFC awarded the company a study contract to explore high pressure APS.	SPCFLT-Vol.15-#6; NHDB-Vol.3
70/07/13	Aerospace and architectural engineering firms were invited to submit proposals to assist NASA in planning ground facilities for a Shuttle system. One firm would be selected as a contractor to support the newly established NASA Shuttle Facilities Group for 12 months in developing an overall facilities plan for a Shuttle. The 12-man Shuttle Facilities Group was headed by R.H. Curtin, NASA Director of Facilities, and included representatives of the Office of Facilities, OMSF, Office of Advanced Research and Technology, NASA's three manned flight centers (MSFC, MSC, and KSC), and the Air Force.	NASA-Rel-70-118
70/07/15	A conference on Shuttle Technology at LeRC was attended by more than 600 representatives of industry, universities, and foreign countries.	A&A(1970)
70/07/17	MSFC requested quotations from aerospace firms for a study of inflight venting of the Space Shuttle. The first objective of the study was to identify venting areas of the vehicle compartments, wings and protuberances, but excluded the main propulsion system which had its own venting arrangement. The contractor would: establish schemes for venting these areas; outline input data requirements for venting analyses; and develop a test program that would provide the information necessary to adequately analyze Shuttle vehicles during launch and reentry.	M-STAR-07/15/70
70/08/00	In an article in AIAA's ASTRONAUTICS AND AERONAUTICS, McDonnell Douglas emphasized the lower cost advantages of the expendable booster for the Shuttle as opposed to the higher cost of development of the recoverable booster. "The Small Tow-back System with delayed development of the booster could not only cost less in the end, but would significantly lower costs in the first half of the late '70s."	AIAA-A&A-Vol.8-No.8
70/09/02	MSC awarded LTV Aerospace Missiles and Space Division and MDAC \$215,000, fixed-price contracts to conduct 6-month parallel development studies of radiative nonmetallics for high-temperature heat protection on the Space Shuttle.	A&A(1970)
70/09/15	Dr. Thomas O. Paine's resignation as NASA Administrator became effective. He was honored at Bolling AFB reception and testimonial dinner given by Dr. George M. Low, who would be Acting Administrator until appointment of successor. Paine had announced his resignation 28 July. Paine denied that his resignation had any connection to proposed NASA budget cuts. Paine would be returning to General Electric, the company where he had worked as an executive before coming to NASA in January 1969.	A&A(1970); Rice-Chron
70/09/22-23	Meetings to select preliminary requirements for the SSME design were conducted at MSFC. Approximately 100 people from three NASA centers and several contractors attended the meetings. The series of meetings began with a briefing for the project's steering committee. The work of the three SSME study contractors was reviewed. The contractors would incorporate future requirements into the studies. Attending the conference were representatives of MSC, MSFC, and USAF. Contractors represented were MDAC, NAR, and the three SSME study contractors.	MSFC-Rel-70-193; M-STAR-09/23/70

DATE	EVENT	SOURCE
70/09/30	McDonnell Douglas made its first PHASE B QUARTERLY REVIEW: SPACE SHUTTLE PROGRAM at MSFC.	Rice-Chron
70/10/02	NASA announced the award of a \$380,000 contract to Ralph M. Parsons Company for engineering services in development of an overall plan for Shuttle ground facilities.	A&A(1970)
70/10/12	FRC announced that tests had demonstrated that unpowered approach and landing maneuvers of the Shuttle could be made safely and readily by qualified professional pilots and did not require highly trained test pilots. United Air Lines captains Donald C. McBain and James V. Mitchell had flown landing approaches of a four-engine jet transport configured to simulate the Shuttle during a NASA study of energy management techniques of the proposed Shuttle orbiter.	A&A(1970)
70/11/04	NASA issued a request for quotations on a study entitled "Shuttle Orbital Applications and Requirements." The due date for quotations was 23 November. Under MSFC direction, the contractor would analyze use of the Shuttle to accomplish and support various prospective missions. The contractor would do the preliminary definition of a selected small manned support module and any other new hardware necessary to supplement the orbiter's mission support capability. The contractor would also define the operational and design interfaces and would provide total mission descriptions. These would include definition of new interfaces, support requirements, new hardware costs and schedules, and pertinent integration and prelaunch schedules for selected Shuttle payload combinations.	M-STAR-11/04/70
70/11/19	MSFC awarded MDAC a \$2-million, 1-year modification to its Shuttle study contract. Under the new agreement MDAC would recommend a program to test the structural components of proposed SRB and orbiter craft, including verification of design and advanced state-of-the-art testing materials, wing leading edges, and propellant tanks. In addition, MDAC was awarded a \$500,000 study of expendable stages and a \$300,000 DOD study on Air Force Requirements.	A&A(1970)
70/12/01	Meetings were held at MSFC to: review contractor design approaches to the SSMEs; discuss potential problems in designs; and review efforts to see that the contractors were proceeding satisfactorily under same basic design requirements. The SSME design review ended on 11 December.	A&A(1970)
	Principal investigator and spacecraft contractor personnel from the High Energy Astronomy Observatory (HEAD) spent two days at MSFC exchanging data on configurations. The HEAD meeting was under the sponsorship of Rodney D. Stewart, MSFC Project Manager.	M-STAR-12/02/70
70/12/11	MDAC presented a briefing on its Shuttle study at MSFC. The presentation was a midterm review of MDAC's "Space Shuttle Program Definition (Phase B) Study." The firm received the 11-month study contract earlier this year. MSFC managed the MDAC work. A parallel study, managed by MSC, was being conducted by NAR, which also held its midterm review at this time at MSC.	M-STAR-12/16/70
	MSC prepared a preliminary draft of Shuttle Phase C/D statement of work. This preliminary Phase C/D SOW largely reflected the criteria for the Space Shuttle set forth in the Phase B Level I Requirements Document.	Rice-Chron

DATE	EVENT	SOURCE
70/12/15	A meeting at MSFC reviewed parallel studies of a proposed chemical interorbital Space Shuttle by NAR and MDAC. Modifications would be required to adapt either a second or third stage of the Saturn V launch vehicle into an Earth-lunar interorbital shuttle. Analyses of the Saturn V modifications would lead to preliminary designs, determine orbital launch operations and procedures, and gather data on preliminary costs, logistics, and facilities. Discussions included results of analyses to date, definition of systems requirements, necessary system and subsystem trade-offs, and selection of preliminary configurations.	A&A(1970)
71/01/00	In an article in AIAA's ASTRONAUTICS AND AERONAUTICS, Air Force Flight Dynamics Laboratory representatives emphasized the desirability of delta wing shuttles as opposed to straight wing shuttles. "The delta emerges as a vehicle flexible in payload and performance.... Predictability [of the delta] is comparatively high, and for the most part, the critical problems have been identified."	AIAA-A&A-Vol.9-No.1
71/01/04	NASA was looking at air bases in the Carolinas, South Florida, and the Bahamas as possible landing sites for Shuttle launched from KSC. NASA engineers also were considering refueling the booster's first stage in flight so that it could return to launch site for landing, like an aircraft.	A&A(1971)
71/01/08	Three aerospace teams, including seven European firms in support roles, submitted proposals to MSFC on preliminary design of the research & applications module (RAM) proposed for the Shuttle. Proposals were submitted to MSFC by MDAC, General Dynamics, and GE. The team headed by General Dynamics would include MATRA of France, ERNO of Germany, SAAB of Sweden, Hawker Siddeley of the U.K., and Fiat of Italy. The GE team would include Messerschmitt-Boelkow-Blohm of Germany and Thompson-CSF of France. The RAM concept offers an economical way to extend the capability of both the Shuttle and the Space Station. These modules would provide versatile and economical laboratory facilities for doing Earth orbital research and applications work.	A&A(1971); NASA-Rel-71-6
71/01/12	MDAC submitted a mass properties status review of its Phase B study conducted under contract NAS8-26016. The review covered the period from 19 September 1970 to 05 January 1971. The review covered two systems--a high crossrange orbiter and booster and a low crossrange orbiter. Both of the systems were designed to deliver a 25,000-lb payload into a 50 nmi X 100 nmi 55 degree inclination orbit or a 40,000-lb payload into a 50 nmi X 100 nmi polar orbit with the airbreathing engines removed, whichever was more severe. The report covered only the booster sized for the delta wing orbiter. The internal packaging of the delta wing orbiter had been improved by using "siamese" integral main propellant tanks. The straight wing orbiter thermal protection system had been changed from columbium panels and carbon-carbon leading edges to hardened compacted fiber (HCF) and ablative leading edges.	Rice-Chron
71/01/13	Calibration was completed at MSFC on a new tube wind tunnel capable of test speeds up to twice speed of sound, the MARSHALL STAR reported. The tube was 130 cm in diameter and was 119 m long. It would be used in the wind tunnel test program for Shuttle.	A&A(1971)
71/01/22	NASA reorganized the Office of Manned Space Flight (OMSF) to reflect new management requirements for future manned flight programs. Dale D. Myers, Associate Administrator for NSF, said the new alignment would provide greater	NASA-Rel-71-10

DATE	EVENT	SOURCE
71/01/22	flexibility in use of manpower and would provide for uniformity of approach in manned flight technical efforts. The five offices directing the programs of MSF--Apollo, Skylab, Space Shuttle, Space Station Task Group, and Advanced Missions--remained essentially the same. The only Shuttle-related change came with the naming of Charles J. Donlan as Acting Director of the Space Shuttle Program, in addition to his regular duties as Deputy Associate Administrator for MSF (technical).	
71/01/29	The NASA Management Council directed a number of changes in the Level I requirements for the Phase B Shuttle study. These were sent out by TWX to the various centers on 29 January and subsequently incorporated in the Phase B STUDY CONTROL DOCUMENT. Dissemination of the changes to the Phase B contractors and principal subcontractors was handled by MSC and MSFC. NASA directed that the remaining portions of the Phase B expendable second stage/reusable booster studies should concentrate on the minimum modification S-IVB stage with J-2S (or required solid rockets) for the MDAC study and on the short S-II stage with two SSMEs for the NAR study.	Rice-Chron
71/02/01	The Level 1 requirements for the Phase B study contracts were modified to call for a first horizontal flight in June of 1976, a first orbital flight in April of 1978, and an operational capability by mid-1979. This replaced the original statement calling for an initial operational capability in the second half of 1977.	Rice-Chron
71/03/01	MSFC issued RFPs to Aerojet General Liquid Rocket Company, UAC Pratt & Whitney Division, and NAR Rocketdyne Division for the development of a main engine for the Space Shuttle. The companies had been performing preliminary design and definition studies of the Shuttle under three independent, \$6-million, parallel contracts since June 1970. In June 1971, one company would be chosen to develop the SSME. In addition to the design of the engine the RFP covered: the design, development, and fabrication of ground support equipment; the fabrication and delivery of 36 engines and support hardware "for the early stage of the vehicle program"; and the design, fabrication, and delivery of 14 dummy engines "for the vehicle horizontal flight test program." Proposals were due 21 April 1971. The selection should be made and the contract placed in force by mid summer.	NASA-Rel-71-32; Rice-Chron
	NASA announced the selection of the Mississippi Test Facility as the site for sea level testing of SSMEs. Also announced were plans to modify the former Saturn II stage test facilities to accommodate SSME testing. The test program would include some 1200 development and acceptance tests from 1973-1979, with 45 to 50 sustaining engineering tests per year afterward, and some 100 development tests under simulated altitude conditions from 1974-1976. The Site Evaluation Board selected the site after surveying existing Government-owned or controlled properties. MSFC would exercise control of MTF. The facility also had deep-water access for transporting large items of hardware along the Pearl River and the Intra-Coastal Waterway. The selection of MTF for the engine test site was the first step in carrying out a master plan for Space Shuttle facilities.	NASA-Rel-71-30; A&A(1971)
71/03/03	The Shuttle was the key NASA development essential in 1970s, Dr. Wernher von Braun, Deputy Associate Administrator for Planning, said in the NASA FY72 budget request presented to the House Committee on Science and Aeronautics. It presented the U.S. with its greatest technological challenge for space in this decade. "Preliminary analysis indicates that if the shuttle is used in lieu of	A&A(1971)

DATE	EVENT	SOURCE
71/03/03	current expendable systems, the transportation costs will be reduced by at least a factor of 10...only by an investment now will we be able to have operational an economical transportation system by the end of the 1970's to support a vigorous and balanced space flight program."	
71/03/11	The Senate confirmed the nomination of Dr. James C. Fletcher as NASA Administrator.	A&A(1971)
71/03/15	Lockheed Missiles and Space Company submitted the eighth status report on their Alternate Concepts study conducted under contract NASB-26362, managed by MSFC. Since June, the study emphasis had expanded from development of the one-and-one-half stage, expendable drop tank option to encompass a feasibility analysis of designing the basic one-and-one-half stage vehicle for growth to a two-stage, fully reusable system.	Rice-Chron
	The AIAA Space Shuttle Development, Testing, and Operations Conference/NASA Space Shuttle Technology Conference was held in Phoenix, AZ. Charles J. Donlan, Deputy Associate Administrator (Technical), OMSF, said NASA plans called for unmanned tests of the Shuttle to begin in 1976 and manned tests in 1977. A fully operational vehicle would be ready in 1979. Colonel John G. Albert disclosed that the DOD planned to use manned reusable rocket planes for "all military space operations." Albert was Director of Space Development for the Air Force.	A&A(1971)
71/04/00	NASA shifted the emphasis of the Phase B Shuttle studies from a completely reusable system to analysis of an orbiter with external expendable hydrogen tanks. This change led to the addition of separate studies of Shuttles with external hydrogen tank orbiters to the existing McDonnell Douglas and North American Rockwell Phase B study efforts.	Rice-Chron
71/04/01	NASA added a new task to three of the five study contracts that was to last the remaining three months of their contracts. The new task entailed the study of an external hydrogen tank for the orbiter of a fully reusable Shuttle. The three contracts affected were the NAR and MDAC Phase B contracts and the Lockheed Phase A contract. Although this new task was funded and performed under the contracts originally let on 30 June 1970, each of the four contractors that conducted the external tank task made a report on that task separate from the report it made for the original contract.	Rice-Chron
71/04/06	The Space Shuttle Technology conference at MSFC discussed space vehicle propulsion systems with operational life requirements of 100 flight missions.	A&A(1971)
71/04/12	NASA selected General Dynamics, Convair Division, for award of a contract for definition and preliminary design of a Research and Applications Module (RAM). Estimated value of the 1-year, fixed-price contract was \$2 million. GDC would conduct preliminary design studies, operational analyses, program planning, and develop mock-ups of critical portions of the RAM for engineering assessment. The contract would be under the technical direction of MSFC.	NASA-Rel-71-67
71/04/20	MSFC announced the award of a \$1,081,343 contract to Research, Inc., to design, fabricate, install, and check out electrical heating devices for prototype heat protection systems. The device would be installed in an existing structural test facility at MSFC and would heat up to 1600K (2500 degrees Fahrenheit) on the lower surface and 1300K (1800 degrees Fahrenheit) on the top surface of test articles. Work on the device would be funded in increments,	A&A(1971)

DATE	EVENT	SOURCE
71/04/20	beginning with \$100,000 for preliminary design phase.	
71/04/21	North American Rockwell, Rocketdyne Division, submitted its SSME proposal.	SPCFLT-Vol.15-#6
71/04/27	Dr. James C. Fletcher officially became NASA Administrator. Dr. Fletcher took the oath of office at the White House in a ceremony attended by President Richard M. Nixon.	Rice-Chron
71/05/16	MSC announced issuance of RFPs for technological development of new surface materials that could stand environmental extremes expected to be experienced by the Shuttle. MSC would award fixed-price contract to company that designed and developed the best ceramic insulator.	A&A(1971)
71/05/22	Future Shuttle missions were described by Dale D. Myers, NASA Associate Administrator for Manned Space Flight, in a speech before the Lions Clubs in Greenville, SC: "These payloads cover the areas of space physics, astronomy, space applications, life sciences, unmanned planetary exploration, and earth resources, military and commercial."	A&A(1971)
71/06/04	Lockheed Missiles and Space Company submitted the final report of its Alternate Shuttle Concepts study, under contract NAS8-26362. The contract was managed by MSFC as a part of the overall Phase B/Second Phase A effort. The report continued to examine the one-and-one-half stage concept.	Rice-Chron
71/06/10	NASA announced management plans for the OMSF Shuttle program. OMSF Headquarters would be responsible for overall program management, including assignment of responsibilities, basic performance requirements, control of major milestones, and funding allocations to NASA centers. Dale D. Myers, Associate Administrator for MSF, had assigned responsibility for program control, overall systems engineering and systems integration, and overall responsibility for the definition of interactive elements in the total system to MSC, which also would be responsible for orbiter stage. MSFC would be responsible for the booster stage and the SSME. KSC would be responsible for the design of launch and recovery facilities. All three centers would station personnel at MSC for systems engineering and integration activity.	A&A(1971)
71/06/16	NASA's interest in a "phased approach" to development of Space Shuttle was announced by Dr. James C. Fletcher. Contractor studies near completion indicated that the preferred configuration was a "two-stage delta-wing reusable system in which the orbiter has external propellant tanks that can be jettisoned." While studies favored a "concurrent approach", NASA also studied the feasibility of sequencing development, test, and verification of the system's features. The phased approach would entail the development of a Shuttle system in which the orbiter would be developed first and initially tested with an interim expendable booster. Full-scale hardware development of a reusable booster would be started later, but some design and preliminary development work would proceed along with orbiter development. Studies in progress would enable NASA to make a decision by fall on the technical and programmatic approach to follow.	NASA-Rel-71-107; A&A(1971)
71/06/23	NASA awarded a contract to NAR Space Division for studying the feasibility of developing a low-cost, reusable chemical propulsion stage that could be launched from earth on the booster and then subsequently refueled in space for up to 10 space missions. The 10-month phase A contract was for \$250,000. This vehicle could be used for a high lift capability to low earth orbit, the	MSFC-111-Chron:1960-1973

DATE	EVENT	SOURCE
71/06/23	placement of large payloads of the order of 100,000 lbs to geosynchronous orbit, and eventually for lunar and unmanned planetary missions. At the time of this contract, engineers at MSFC were requiring that the interorbital stage have a lifetime of 3 years or 10 uses in space, whichever came first from the cutoff period. It would be designed for maintenance to be carried out in earth orbit and for a quiescent state in orbit for periods of up to 180 days. The interorbital stage would utilize many components and systems of the Shuttle.	
71/06/24	MSFC announced the selection of NAR Rocketdyne for a 16-month, \$1.1 million contract to develop turbo pump assemblies for the hydrogen and oxygen Auxiliary Propulsion System (APS) technology program. The six-phase contract included: exploratory study; design for turbo pump components; fabrication of turbo pump system; testing, refurbishing, acceptance testing, and delivery to NASA; and engineering support.	A&A(1971)
71/06/25	North American Rockwell (NAR) gave NASA the final report of its ORBITER EXTERNAL HYDROGEN TANK STUDY. NAR had made this study as an additional task of its Phase B contract, and it focused on a design comprised of an orbiter with external hydrogen tanks and a booster designed so that "the structure and propellant tankage are used as a heat sink." NAR called this configuration OEHT, Orbiter External Hydrogen Tank.	Rice-Chron
	The North American Rockwell Corporation (NAR) issued the PHASE B FINAL REPORT. In Volume I of its report, NAR asserted that the report proved that a fully reusable Shuttle could be built and operated economically.	Rice-Chron
71/06/28	Lockheed Missiles and Space Company submitted the final report of its study of external hydrogen tanks. This study was conducted as Task IV of the Phase A Alternate Shuttle Concepts study under contract NASB-26362 managed by MSFC. The study was directed in conjunction with the shift of emphasis in the Phase B Shuttle contracts from fully reusable to external hydrogen tank designs.	Rice-Chron
71/06/29	MSFC contracted a 4-month extension to the Lockheed Phase A, alternate stage-and-a-half Shuttle contract NASB-26362. This was a part of the total procurement package supporting the Space Shuttle Phased Development Study effort.	Rice-Chron
	MSFC contracted a 4-month extension to the Phase B Shuttle study contract, NASB-26016, with McDonnell Douglas (MDAC). This extension was part of the total procurement effort in support of the Space Shuttle Phased Development Study. The objective of this effort was to evaluate the feasibility of developing a two-stage Space Shuttle system starting with the orbiter and an interim, expendable, booster, then proceeding to the development of a fully reusable booster.	Rice-Chron
71/06/30	McDonnell Douglas (MDAC) issued the EXTERNAL LH2 TANK STUDY FINAL REPORT as part of its SPACE SHUTTLE SYSTEM PHASE B STUDY FINAL REPORT. MDAC conducted "a parametric analysis that examined approximately 100 different booster/orbiter configurations." From this analysis MDAC chose a configuration with the recommendation of a single Shuttle design with ET and orbiter.	Rice-Chron
	McDonnell Douglas Corporation submitted the final report of their Phase B study conducted with Martin Marietta, Denver Division, TRW Systems Group and Pan American Airways under contract NASB-26016, managed by MSFC. The final McDonnell Douglas Phase B fully reusable system was a two-stage vehicle with a	Rice-Chron

DATE	EVENT	SOURCE
71/06/30	gross liftoff weight in the 4.6 million pound range.	
71/07/01	MSC announced award of four, 4-month, fixed-price extensions to contracts for Shuttle preliminary design. MDAC, North American Rockwell, and General Dynamics would each receive \$2,800,000 and Lockheed would receive \$1,400,000. Each company was requested to study the advantages and disadvantages of a "phased approach" to the development of the Space Shuttle. Based on data from these studies, NASA expected to decide in the fall if a "phased approach" to development of the Space Shuttle would be undertaken instead of concurrent development of both the orbiter and the booster.	A&A(1971); NASA-Rel-71-121
71/07/06	Grumman Aircraft Corporation (GAC) gave NASA its ALTERNATE CONCEPTS STUDY FINAL REPORT which detailed the results of its Alternate Phase A contract.	Rice-Chron
	MSC announced selection of MDAC to receive a \$380,000, 10-month, firm-price extension to contract for design study of the auxiliary propulsion system (APS). MDAC would define oxygen-hydrogen system compatible for both booster and orbiter vehicles.	A&A(1971)
71/07/12	The selection of NAR Rocketdyne for negotiations leading to award of a \$500 million, cost-plus-award-fee contract for development and delivery of 35 SSMEs by 1978 was announced by NASA. The selection followed a 12-month Phase B competition during which NASA accepted proposals from three firms on 21 April. The program would be managed by MSFC and would support Shuttle orbital flights beginning in 1978.	NASA-Rel-71-131
71/07/14	NASA awarded 7-month contracts to MDAC (\$325,000), General Electric (\$319,200), and Lockheed (\$322,500) for development and testing of a ceramic insulator for thermal protection.	SPCFLT-Vol.15-#6; NHDB-Vol.3
	NASA awarded a feasibility study (Phase A) contract to NAR to examine a low-cost, reusable chemical stage for the Shuttle booster. The contract value was \$250,000, and the duration was 10 months.	NHDB-Vol.3; SPCFLT-Vol.15-#6
71/07/22	MDAC submitted the results of its Phase A study of expendable second stages for the reusable booster, conducted as an add-on task to contract NASB-26016. The study grew out of MDAC's Phase B effort and was driven by the need to develop a capability for orbiting payloads in excess of 100,000 lbs. The study was based on the MDAC Phase B high wing canard flyback booster design, frozen as of September 1970. The vehicle had a liftoff weight of 2,840,111 lbs with twelve engines developing a total of 4,800,000 lbs of sea level thrust. MDAC concluded that such a system could, using a variety of second stages, orbit payloads of 120,000 to 170,000 lbs at a recurring cost of \$17-26 million per launch. MDAC recommended that a Phase B definition of a "minimum modification" S-IVB/J-2/SRM expendable second stage system be initiated. MDAC further recommended that Phase B work on an expendable second stage be delayed.	Rice-Chron
71/08/03	UAC Pratt & Whitney Division filed a formal protest against the award of a \$500-million SSME contract to NAR Rocketdyne and asked the Federal Government to reverse the award. In a letter to GAO dated 18 August 1971, Pratt & Whitney charged that the selection of Rocketdyne was "illegal, arbitrary, and capricious, and based on unsound decisions."	A&A(1971)
71/08/04	The MSFC Shuttle Task Team was realigned to coincide with instructions	M-STAR-08/04/71

DATE	EVENT	SOURCE
71/08/04	issued to contractors to study various configurations of interim concepts. Changes included in the realignment were: Alex McCool of the Astronautics Lab would be responsible for the Titan III-L effort; Lewis McNair of Central Systems Engineering would be responsible for the Convair Core concept; Fred Vreuls of the Product Engineering Lab would be responsible for the Saturn IC effort; and Dan Driscoll of the Astronautics Lab would be responsible for solids. Overall condition and planning would be conducted by Bob Weir and Fred Hammers. The Vehicle Development Office (Howard Burns) and Program Control Office (Bill Hallisey) would provide support as required to all groups.	
71/08/10	President Richard M. Nixon signed into law the \$3.298 billion FY72 NASA appropriation bill. The money appropriated was \$86 million below the amount stipulated in the agency's FY72 authorization act.	Rice-Chron
71/08/12	NASA awarded contracts to Textron, Bell Aerospace Division (\$484,400), and Rocketdyne (\$460,445), for 14 months of design and development for testing of thermally controlling Auxiliary Propulsion System propellants hardware.	SPCFLT-Vol.15-#6
71/09/01	MSFC had signed a level-of-effort contract with NAR Rocketdyne for the design of the SSME, NASA announced. The interim contract--for 4 months at \$1 million per month--had been signed pending GAO review of a protest made by United Aircraft, Pratt and Whitney Division, regarding the contract award [see 71/08/18].	A&A(1971)
71/09/10	McDonnell Douglas reduced to four the number of configurations actively under consideration in its Phase B extension under contract NAS8-26016. These included three systems based on the MDAC baseline delta which had emerged from the ten option booster matrix assigned by NASA at the beginning of the contract extension effort. The fourth was the MDAC identical vehicle concept.	Rice-Chron
71/09/30	As of 30 September conceptual drawings of the structural arrangements for the 156-inch diameter, solid cluster booster had been completed.	MSFC-111-Chron:1960-1973
71/10/07	NASA announced a 6-month delay in development to give contractors more time to study, in detail, alternatives resulting from current studies. Under the new schedule, North American Rockwell, McDonnell Douglas Aerospace, Lockheed Missiles & Space, and Grumman Aerospace would study designs until 28 February 1972, rather than concluding at the end of October 1971. The selection of sites for Shuttle development and operational flights would be deferred until overall system characteristics were defined. The extension included a 2-month option, until 30 April 1972, for the Phase B studies. The baseline study would examine ballistic recoverable boosters with either F-1 engines in a series burn, pressure-fed engines in a series burn, or twin pressure-fed engines in a parallel burn configuration.	A&A(1971); SPCFLT-Vol.15-#6
71/10/27	McDonnell Douglas Corporation conducted a review at MSFC of its work on boosters. The work was completed under the extension of MDAC's Phase B Shuttle study conducted under contract NAS8-26016. Booster options briefed by MDAC were the reusable F-1 flyback system and the recoverable pressure-fed system. The review placed considerable emphasis on recovery, refurbishment, operations and testing.	Rice-Chron
71/11/01	Two 4-month contracts for feasibility studies of a pressure-fed engine for the water-recoverable booster were awarded by MSFC. TRW would receive \$400,000	A&A(1971); SPCFLT-Vol.15-#6

DATE	EVENT	SOURCE
71/11/01	and Aerojet General would receive \$367,595 for studies ending 29 February 1972. The announcement of the award was made 7 December 1971.	
71/11/03	McDonnell Douglas Corporation conducted an OMSF design review of its Phase B extension study effort carried out under contract NASB-26016, managed by MSFC. The McDonnell Douglas study had narrowed its focus down from the four configurations selected in September to three closely related baseline designs which, with an additional derivative configuration, were selected for in-depth analysis.	Rice-Chron
71/11/10	MSFC issued a \$64,389 contract to Waldemar S. Nelson and Company, New Orleans, LA, for a feasibility study of a Space Shuttle fly-away airport.	MSFC-III-Chron:1960-1973
71/11/15	Lockheed Missiles and Space Company submitted the final report of their Alternate Concepts study extension. This study was carried out under contract NASB-26362, managed by MSFC. It was an extension of the Lockheed Phase A Alternate Shuttle Concepts study and was conducted in tandem with the first Phase B extension.	Rice-Chron
	McDonnell Douglas submitted the final report on its work under the first Phase B contract extension. The study effort covered in the report was carried out under Modification 19 to contract NASB-26016, managed by MSFC.	Rice-Chron
71/11/18	Amid rising speculation as to what the Shuttle would eventually be, NASA Administrator Dr. James C. Fletcher explained the current situation in a speech before the National Space Club in Washington on 18 November. He explained that the baseline Shuttle (two fully reusable, hydrogen-fueled stages) remained the preferred approach, but NASA had been studying for the past several months a number of options to the baseline Shuttle. NASA might possibly develop the orbiter and the booster in two phases. The Mark I orbiter could be flown in 1978 and the Mark II orbiter in the early 1980s. NASA's thinking was reasonably firm on the orbiter: it would have an external, expendable tank carrying both hydrogen and oxygen; the main orbiter engine would initially be either an improved version of the J-2 or a new high-pressure engine; the booster would be either flyback or recoverable.	MSFC-III-Chron:1960-1973
71/11/19	MSFC awarded a contract to Chrysler Space Division, New Orleans, LA, for further study of booster concepts. The contract was for \$765,000 and would continue through 29 February 1972. NASA had asked Chrysler to define recoverable booster concepts for the Space Shuttle program. Results from this study and other Phase B studies would be used by NASA to select a preferred Space Shuttle design.	MSFC-III-Chron:1960-1973
71/12/01	Safety problems of the Shuttle were discussed by Director I. Irving Pinkel of LeRC Aerospace Safety Research and Data Institute, in an A&A article. "The rocket engine must have an airplane-like endurance of 10 years (100 missions). The airplane systems must operate where rockets do, subject to space vacuum, space radiation, and reentry heating, and still carry a fan engine with high cycle temperature."	A&A(1971)
71/12/09	McDonnell Douglas presented a design review at MSC. The review covered work done under the second extension of MDAC's Phase B study under contract NASB-26016, managed by MSFC. The review focused on a comparison of parallel burn and series burn options, orbiter engine selection, and orbiter design evolution.	Rice-Chron

DATE	EVENT	SOURCE
71/12/15	Lockheed Missiles and Space Company presented a review of its Alternate Concepts study extension, carried out under contract NAS8-25362, managed by MSFC. The review focused on four principal concepts, all using the MSC Orbiter 040A design with a single expendable ET.	Rice-Chron
	McDonnell Douglas presented OMSF a review of its work under the second extension of the Phase B Shuttle System study, carried out under contract NAS8-26016. The review revolved around four baseline designs: Mark I/II Flyback Booster, Single RAO Series Burn, Twin RAO Parallel Burn, and Twin RAO SRM. All of these configurations used the baseline McDonnell Douglas delta wing orbiter developed and adopted during the first Phase B extension.	Rice-Chron
	The Shuttle Aerothermodynamics Technology Conference at Ames discussed technology for manned spacecraft that could fly to aircraft-like landing. More than 30 papers were presented on design, operation flight mechanics, flow fields, and heat transfer.	A&A(1971)
71/12/22	NASA announced that it had authorized MSFC to extend for 1 month the level-of-effort contract with NAR Rocketdyne Division for design of the SSME. Action had been taken pending completion of a GAO review of United Aircraft, Pratt & Whitney Division's protest of the contract award to Rocketdyne [see 71/08/18].	A&A(1971)
71/12/29	Top administrators of NASA and the Office of Management Budget (OMB) met to decide what Shuttle configuration should be recommended to President Richard M. Nixon. This was in preparation for the President's upcoming, 5 January 1972 announcement committing his administration to building the Space Shuttle.	Rice-Chron
71/12/30	NASA announced award of a \$1.6 million, cost-plus-fixed-fee contract to Aerospace Corporation for studies of advanced space programs. Studies, which would advance work performed under a previous contract, would include mission and payload capture analysis, payload analysis for applications, analysis of advanced program operations and logistics analysis, and advanced missions safety.	A&A(1971)
72/01/00	Aerospace Corporation presented their final report on an Integrated Operations/Payloads/Fleet Analysis conducted for NASA to establish a satisfactory Shuttle traffic model.	SPCFLT-Vol.15-#7
72/01/05	Acting Shuttle Program Director Charles Donlan announced the decision to build the Space Shuttle to the NASA centers and the Air Force commands that were directly involved in the development of STS.	Rice-Chron
	In a press conference at which NASA Administrator Dr. James C. Fletcher participated, President Richard M. Nixon announced his decision to have NASA proceed with building the Space Shuttle. The President cited the "routinizing" of space transportation as the key issue in deciding to proceed with the development of the Space Shuttle. The reduction in cost of space travel anticipated as a result of the Shuttle's existence was also cited as being a significant justification for the development of the system. "The general reliability and versatility which the Shuttle system offers seems likely to establish it quickly as the workhorse of our whole space effort."	NASA-Rel-72-4; Rice-Chron
72/01/10	Events leading to President Nixon's endorsement of Shuttle development were	A&A(1972)

DATE	EVENT	SOURCE
72/01/10	reported by AVIATION WEEK & SPACE TECHNOLOGY. "The struggle between NASA and OMB officials reached the point of acrimony when the latter suggested design changes and demanded to know from NASA engineers the dollar savings that would result. Dr. James C. Fletcher, NASA Administrator, finally appealed directly to the office of the President with a complaint that OMB was attempting to design the Shuttle rather than merely budget it." President Nixon removed the OMB accountant from the conference with NASA and demanded an agreement. "The dispute culminated in Fletcher's triumphal flight to San Clemente...to join in the announcement that the Space Shuttle had been approved by the Administration."	MSFC-III-Chron:1960-1973
72/01/13	MSFC selected Aerojet General, Lockheed Propulsion, Thiokol Chemical and UTC to receive separate, 2-month, \$150,000 study contracts to analyze the possible use of SRMs with 305- and 396-cm (120- and 156-in) diameters to power the Space Shuttle booster. The award was announced on 27 January 1972.	A&A(1972); SPCFLT-Vol.15-No.7
72/01/25	The Subcommittee on NASA Oversight submitted to the House Committee on Science and Astronautics SPACE SHUTTLE-SKYLAB: MANNED SPACE FLIGHT IN THE 1970s. The status report was prepared by Committee staff at the request of Subcommittee Chairman Rep. Olin E. Teague from information from NASA space flight centers and key industrial contractors. Included in the text were conclusions concerning existing technology and potential uses of both Skylab and Space Shuttle.	A&A(1972)
72/01/31	Mathematica, Inc., published ECONOMIC ANALYSIS OF THE SPACE SHUTTLE SYSTEM. The study, directed by Klaus P. Heiss and Oskar Morgenstern, concluded that the development of the system was economically feasible assuming that the level of space activity equaled the average of the U.S. unmanned space program of the past 8 years. The thrust-assisted orbiter shuttle (TAOS) with external hydrogen and oxygen tanks was the economically preferred choice among current configurations. The choice of TAOS was still open, with pressure-fed boosters and SRMs using parallel burn as the main economic alternatives. The third economic choice was the use of series-burn boosters.	A&A(1972)
72/02/03	Robert F. Thompson convened the first meeting of the Shuttle Phase C/D Source Evaluation Board. In his opening remarks, he announced that the release date for the RFP was 15 March, technical proposals were due 1 May, and cost proposals 8 May. Contract awards were to follow in June.	Rice-Chron
72/02/04	MSC announced the award of a \$175,183 cost-plus-fixed-fee contract to CAL, Inc., to conduct simulations of orbiter approach and landing. Simulations would enable engineers to establish more accurately the aft location of the orbiter's center of gravity and to design systems for vehicle aerodynamic control. The contract would end in July 1972.	A&A(1972)
72/02/22	NASA OMSF design review examined the alternative configurations analyzed this far in the second Phase B extension. These included pressure-fed, F-1 high	SPCFLT-Vol.15-#7

DATE	EVENT	SOURCE
72/02/22	pressure, and 120- or 156-inch solid propellant boosters in a series burn configuration, and twin 156-inch solid propellant, twin pressure-fed liquid propellant, or clustered 120-inch solid propellant boosters with a parallel burn to the orbiter's own propulsion system. Costing analysis indicated the series or parallel burn pressure fed booster would cost about \$7 billion to develop for a launch cost of \$6.5 million. The twin solid propellant parallel booster would cost \$5.5 billion to develop with a launch cost of \$10.5 million. The design review also examined a reduced scale orbiter and elected to pursue the original capability of 65,000 pounds to a 100 nm due east orbit with a 60-foot by 15-foot cargo bay.	
72/03/07	MSFC announced it had extended the interim contract with NAR Rocketdyne for SSME design. A 1-month, \$1-million extension was awarded pending completion of a review by the General Accounting Office of the original \$500-million contract awarded on 13 July 1971. The review had been requested on 03 August 1971 by United Aircraft, Pratt & Whitney Division.	A&A(1972)
72/03/15	Lockheed Missiles and Space Company published the final report of their Phase B Extension Space Shuttle Concepts study conducted under contract NAS8-26362. The report focussed on the question of booster and launch arrangement selection. The study effort was directed toward a delta wing orbiter based on the MSC Orbiter 040 design with a single external LOX/LH tank for primary boost propellant.	Rice-Chron
	McDonnell Douglas Corporation submitted the final report on its Phase B System Study Extension, conducted under contract NAS8-26016 managed by MSFC. The report was prepared in five volumes.	Rice-Chron
	The decision to power the Shuttle booster by recoverable, reusable SRMs in a parallel burn configuration rather than by pressure-fed, liquid-fueled rocket motors was announced by Dr. James C. Fletcher to the Senate Committee of Aeronautical and Space Sciences during FY73 authorization hearings. The "choice was made in favor of the solid parallel burn because of the lower development cost and the lower technical risks." The cost estimate for development became \$5.15 billion instead of the earlier estimate of \$5.5 billion. RFPs would be about 17 March 1972. NASA's booster studies since January showed that both solid and liquid propelled configurations would have been feasible from a technical standpoint.	A&A(1972); NASA-Rel-72-61
72/03/17	NASA requested that the aerospace industry submit proposals for development of a Space Shuttle. NASA issued requests for proposals for the development of an orbiter vehicle and systems integration for the Shuttle orbiter's ET, SRBs, SSME, and air-breathing engine [see 72/03/15]. The Space Shuttle program would consist of two phases: the Shuttle system development and production phase; and the Shuttle operational phase. Technical proposals were to be submitted by 12 May 1972, with cost proposals due one week later. The overall direction of the program lay with OMSF. Orbiter stage and program management responsibility belonged to MSC. MSFC was responsible for the entire propulsion system. KSC would head the design of launch and recovery facilities.	A&A(1972); NASA-Rel-72-63
72/04/04	NASA awarded a 90-day letter contract to the Rocketdyne Division of North American Rockwell, Canoga Park, CA, for the initiation of development and production of the rocket engine for the Shuttle orbiter stage. NASA estimated the value of this letter contract at \$9,800,000. The contract would permit work	MSFC-111-Chron:1960-1973

DATE	EVENT	SOURCE
72/04/04	to begin while NASA and Rocketdyne negotiated a cost-plus-award-fee contract for the engine. NASA estimated that the total cost of the negotiated contract would be in the vicinity of \$450,000,000. This contract award followed a 31 March decision by the General Accounting Office upholding NASA's disputed selection of Rockwell for this contract.	
72/04/12	A Shuttle Technology Conference was held in San Antonio, TX, in conjunction with the 13th Structures, Structural Dynamics and Materials Conference of the American Institute of Aeronautics and Astronautics, the American Society of Mechanical Engineers, and the Society of Automotive Engineers. Topics discussed included aeroelasticity and loads, structure and liquid interactions, vehicle dynamics, test and analysis, thermal protection systems, and structural design. Apollo 8 Astronaut James A. Lovell, Jr. was a member of a panel for high school students that discussed benefits to be derived in Space Shuttle use.	A&A(1972)
72/04/14	The selection of KSC in Florida and VAFB in California as Shuttle launch and landing sites was announced by Dr. James C. Fletcher in Washington, D.C. KSC would be used for research and development launches, to begin in 1978, and for all operational flights into easterly orbits. NASA would provide facilities at KSC through modification of existing facilities. VAFB would be phased in toward the end of the decade for flights requiring high-inclination orbits. DOD would provide basic facilities. NASA Site Review Board studies showed that the KSC-VAFB combination had cost, operational, and safety advantages over all other sites. The cost of establishing facilities at KSC was estimated at \$150 million; at VAFB, \$500 million.	A&A(1972)
72/04/20	The House approved HR 14070, a \$3.429-billion FY73 NASA authorization bill [see 72/03/23] by a vote of 277 to 60 after defeating an amendment by Rep. Les Aspin (D-WI) to defer Shuttle development until NASA completed the study. The House also defeated an amendment by Rep. Charles D. Rangel (D-NY) to delete \$3 million for support of a NASA tracking station in South Africa.	A&A(1972)
72/05/12	Extension of the MDAC contract for design study of orbiter auxiliary propulsion systems (including a study of earth-storable propellants) was announced by MSC. The extension increased contract value to \$576,000 and carried it through 15 October 1972.	A&A(1972)
	Four companies submitted technical proposals to MSC for a Shuttle contract: Grumman Aerospace; Lockheed; North American Rockwell, Space Division; and McDonnell Douglas Aerospace.	A&A(1972)
72/05/16	MSFC reached an agreement with the U.S. Army Corps of Engineers, Huntsville Division, to provide facility design and construction in support of the Shuttle.	SPCFLT-Vol.15-#7
72/06/21	MSFC received proposals from Irvin, Goodyear, Lockheed, Northrop, and the University of Michigan for the evaluation of solid propellant booster recovery techniques.	NHDB-Vol.3; SPCFLT-Vol.15-#7
72/06/24	KSC announced the award of a \$82,000 fixed-fee contract to Howard, Needles, Tammen, and Bergendorff for a preliminary survey of Launch Complex 39 as the proposed site for the Space Shuttle Landing Facility.	A&A(1972)
72/07/00	Cost estimates from Phase B contractors indicated a total research and	SPCFLT-Vol.15-#7

DATE	EVENT	SOURCE
72/07/00	development price of approximately \$11 billion for the fully reusable two-stage Shuttle. The development schedule incorporated a horizontal flight in 1977 and a first manned orbital flight in mid-1978. High costing rates prompted interest in expendable unmanned booster stages.	
72/07/01	Dr. Wernher von Braun, NASA Deputy Associate Administrator, retired from NASA to join Fairchild Industries as Corporate Vice President for Engineering and Development. Dr. von Braun had served as MSFC Director from July 1960 through March 1970.	MSFC-111-Chron:1960-1973
72/07/10	MSC announced three awards for Space Shuttle work. Textron, Bell Aerospace Division received a \$261,500 firm-fixed-price contract, and NAR Space Division received \$258,000 for constructing and testing SSME thrust chambers for in-space maneuvering. Bell Aerospace also received a 15-month, \$540,000 cost-plus-fixed-fee contract to study and design a hypergolic bipropellant engine for the orbiter reaction control system.	A&A(1972)
72/07/26	NASA selected NAR Space Division for negotiation of a 6-year, \$2.6-billion cost-plus-fixed-and-award-fee contract as prime contractor to begin developing the orbiter. The increment covering the first 2 years was \$540,000 million. NAR (selected from four firms submitting proposals) would be responsible for design, development, and production of the orbiter vehicle and for integration of all elements. The SSME was being developed by NAR Rocketdyne Division under an earlier contract. The ET and SRBs would be procured after system engineering for the orbiter had progressed sufficiently. Runner-up in the competition was Grumman, followed by MDAC and Lockheed.	A&A(1972); SPCFLT-Vol.15-#7
72/08/07	Grumman, McDonnell Douglas, and Lockheed were debriefed by NASA as to the reasons for their failure in the Phase Competition.	SPCFLT-Vol.15-#8
72/08/09	NASA and North American Rockwell signed letter contract NAS9-14000 for the development and construction of the Space Shuttle System. The contract provided authority to proceed while a definitive contract was negotiated. The contract gave a broad definition of the vehicle that NAR was to build. NAR had the responsibility of building the Shuttle orbiter and integrating the whole Shuttle system into a flight vehicle. Interim value of the contract was \$12.3 million.	RIC-Chron; SPCFLT-Vol.15-#8
72/08/15	A symposium on composite structural materials for Shuttle application at MSFC reviewed progress and facilitated the exchange of Space Shuttle composites information originated by NASA centers and contractors. The symposium concluded on 16 August.	A&A(1972)
72/08/16	NASA announced the signing of a definitive contract with NAR Rocketdyne for development and production of the SSME. NASA had announced the selection of Rocketdyne for the negotiation of a contract on 13 July 1972, but the award had been delayed pending the outcome of a test made by Pratt & Whitney. Initial work had been under way for several months under temporary contracts during final negotiations. The first increment of the cost-plus-award-fee contract for primary development through 31 August 1975 was estimated at \$205,766,000. The second increment of \$236,709,000 would be for engine production and remaining development from 1 September 1975 to 30 June 1976.	A&A(1972)
72/09/06	MSFC announced plans for a series of 20 water-entry simulation tests with a solid-fueled rocket casing assembly. The tests would provide valuable data for	A&A(1972)

DATE	EVENT	SOURCE
72/09/06	assessment of SRB parachute water recovery and aid in preliminary SRM design. The rocket assembly--representing a 77% scale model of the Shuttle booster--was 30 m (100 ft) long, weighed 39,000 kg (43 tons). The assembly was from a previously fired motor.	
72/09/07	MSFC conducted an ET and SRB review followed by a symposium on the two systems for potential bidders on the contracts in question. The NASA ET presentation addressed tank definition, low cost mechanical components, low cost manufacturing techniques, nondestructive testing techniques, and assembly methods. The SRB presentation addressed a study by Aerospace Corporation, booster definition, static loads, case materials and recovery systems. The reviews concluded on 8 September.	Rice-Chron
72/10/00	North American Rockwell, Space Division, established a development baseline for the Shuttle. The orbiter would be 125 feet 9 inches long with a wingspan of 83 feet 9.7 inches weighing 170,000 pounds empty and 238,093 pounds at launch. Each SRB would be 184 feet 9 inches long with a diameter of 13 feet weighing 212,000 pounds empty and 1.627 million pounds with propellant producing a per unit thrust of 4.13 million pounds at launch. The ET would be 182 feet long, 26 feet 6 inches in diameter and fully loaded would weigh 1.782 million pounds. At launch the configuration would stand 202 feet 3 inches high, would weigh 5.41 million pounds and with the three 470,000-pound thrust SSMEs assisting liftoff would produce a thrust of 9.385 million pounds.	SPCFLT-Vol.15-#8
72/10/05	NASA Administrator Dr. James C. Fletcher issued a detailed report on the choice of North American Rockwell for Space Shuttle development and reasons for rejecting McDonnell Douglas, Grumman and Lockheed.	SPCFLT-Vol.15-#8
72/10/31	Arnold W. Frutkin announced the NASA decision that all subcontracting on the Space Shuttle orbiter would be restricted to U.S. companies.	SPCFLT-Vol.15-#8
72/11/13	The Shuttle program requirement review was held by NAR, Downey, CA. Work on the orbiter stage under a \$2.6-billion contract had been accelerated, and design of the system had been altered to trim rising weight and costs of both the orbiter and the overall system. Program Director Robert Thompson announced the flight schedule: first horizontal flight (orbiter only), 1976; unmanned vertical flight, 1977; first manned orbital flight, early 1978; first operational flight early 1979; regular operations (60 flights per year), end of 1982. Program officials estimated program costs at \$5.15 billion.	A&A(1972)
72/11/21	MSFC announced the issuance of requests for proposals on space tug systems. The tug would extend the capability of the Shuttle booster and orbital by adding propulsion for a higher orbit. Propulsion would be provided by temporary use of existing rocket stages adapted for launch from the cargo bay or by use of an interim tug. Studies of rocket stage use were under way. RFPs had been issued for possible interim tug development. Three \$750,000 contracts would be awarded--two for work on a cryogenic tug using storable propellants. Proposals were due 22 December, with contracts to be awarded the first quarter of 1973. The Air Force would assist in funding cryogenic tug studies and in selection of contractors and study management. The interim tug would be developed for use in the Space Shuttle's first flight scheduled for the late 1970's.	A&A(1972)
72/12/12	A review of plans for the ET and SRB was held at MSFC for 350 industry and government representatives. Attendees heard presentations by NASA and NAR on	A&A(1972)

DATE	EVENT	SOURCE
72/12/12	12 December. NASA officials conducted separate briefings on 13 December. The first review was held on 7-8 September 1972.	
72/12/15	The Shuttle Requirements Change Board approved major down-sizing of the Shuttle. The reduction in the size of the Shuttle reflected NASA's efforts to meet the pressures of lower funding and deal with technical considerations. Among the more important decisions by the board were those setting the orbiter's gross weight at 150,000 pounds, and its return payload capability at 25,000 pounds.	Rice-Chron
73/01/05	MSFC began 1973 faced with new reductions. Dr. Eberhard Rees announced that as part of these reductions, the manpower buildup on the Shuttle would be slowed down, with some resulting delay in the Shuttle's first orbital flight.	MSFC-111-Chron:1960-1973
73/01/26	Dr. Rocco A. Petrone, Apollo/ASTP Program Manager, became MSFC Director on the Retirement of Dr. Eberhard F. M. Rees. The appointment had been announced 22 December 1972.	A&A(1973)
	MSC announced the award of a \$1,375,484 cost-no-fee contract to the Charles Stark Draper Laboratory at the Massachusetts Institute of Technology for the technical support for guidance, navigation, and control in the Shuttle program. The Laboratory would develop and evaluate mission requirements, integration of guidance, navigation, and control with avionics and the Shuttle, failure detection, navigation techniques, and guidance policies.	A&A(1973)
73/02/10	Water impact and towing tests of the SRB were conducted by the Navy at the Long Beach, CA, Naval Shipyard, under MSFC direction. Officials gathered data on retrieval of reusable solid-fueled motor casings jettisoned from the orbiter stage at 40 km (25 mi) altitude. The test hardware, a 77%-scale model of the Shuttle booster, was dropped from heights of 0.3 to 12 m (1 to 40 ft) at angles of 10, 20, and 30 degrees off vertical. The model was towed at speeds of 3.7 to 14.8 km per hour (2.3 to 9.2 mph). KSC was responsible for development of the retrieval techniques; MSFC, for design and fabrication of solid propellant reusable boosters. The tests were concluded on 10 March 1973.	A&A(1973)
73/02/13	The establishment of a task team to focus on space tug activities was announced by MSFC. The team under Manager William Teir and Deputy William Huber, would direct early planning and design of the tug--a vehicle to supplement the Shuttle's capabilities. The tug was to be a payload and would become the third stage after being deployed in earth orbit by the Shuttle. Its rocket engine would propel payloads to different earth orbits or send payloads on planetary missions.	A&A(1973)
73/02/14	The selection of four firms to negotiate contracts to study systems for the space tug was announced by MSFC. GDC and MDAC each would perform a 10-month study of a cryogenic tug using liquid hydrogen and liquid oxygen propellants. GAC and MMC would perform parallel studies of the tug using storable propellants.	A&A(1973)
73/02/17	President Nixon signed S.J.R. 37 into Public Law 93-8, redesignating the Manned Space Flight Center the Lyndon B. Johnson Space Center in honor of the late President. As senator, Johnson had written, introduced, and helped to enact legislation which created NASA.	A&A(1973)

DATE	EVENT	SOURCE
73/03/06	NASA and Shuttle contractors held their third quarterly review at MSFC. The review was attended by 400 people and provided information on ETs and SRBs.	A&A(1973)
73/03/07	Elements of the Shuttle preliminary bioresearch laboratory simulator had been delivered to MSFC, MSFC announced. The equipment would be installed aboard the payload carrier simulator for testing. The bioresearch laboratory model, the first shuttle-era payload to be delivered for testing and integration at MSFC, included mass measurement and microscopy units, a preparation unit, a centrifuge, a cryogenic freezer for storage of tissue, and an instrument for freeze-drying tissue.	A&A(1973)
73/03/09	The Subcommittee on Manned Space Flight transmitted SPACE SHUTTLE-SKYLAB, 1973: STATUS REPORT, JANUARY 1973 to its parent House Committee on Science and Astronautics. The report covered the transition from the design to the development phase of the Shuttle program. It also included the updated cost, performance and status of the Skylab program. The Subcommittee concluded that technology and resources existed for the successful development of the NASA configuration of an earth-orbital Shuttle and that the design would permit the total development cost to stay below \$10.5 million. Success in meeting this cost was "particularly sensitive" to the cost of the hydrogen-oxygen tanks and an acceptable recoverable and refurbishment cost of the SRBs. The report also concluded that development of space tug and a low-cost Shuttle system was essential if the U.S. was to realize the full benefits of space exploration.	A&A(1973)
73/03/15	JSC announced the issuance of RFPs to build hydraulic actuators for Space Shuttle applications and to test them under simulated space conditions. The actuators were being considered for aerodynamics surface and thrust vector control on the Shuttle. Proposals, leading to a firm-fixed-price research and development contract, were due by 2 April. Work was to be concluded 12 months after the contract award.	A&A(1973)
73/03/29	Four 7-year subcontracts totaling \$140-million for the design and fabrication of major structural components for the orbiter were awarded by RIC. Fairchild Hiller received a \$13-million contract for the design and fabrication of the vertical tail. GAC received a \$40-million contract to design and build the double delta orbiter wing. Convair Aerospace Division of GDC was awarded a \$40-million contract to build the mid-fuselage that formed the payload bay section. MDAC received a \$50-million contract to design and build the orbital maneuvering system that would aid in orbital circularization and change and in rendezvous and deorbit maneuvers.	A&A(1973)
73/04/02	NASA released to industry a request for proposals for design, development, and production of the ET. Invited to bid were MDAC, Boeing, Chrysler and MMC Aerospace Division.	A&A(1973)
73/04/16	A lightweight Space Shuttle was being refined by NAR Aerospace Group, AVIATION WEEK & SPACE TECHNOLOGY reported. The lightweight version, with a gross liftoff weight of 1.86 million kg (4.10 million lb), was scaled down in size from the previous baseline configuration which had a GLOW of 2.38 million kg (5.25 million lb). It had the same maximum payload capability of 29,480 kg (65,000 lbs). The major weight reduction had been achieved by switching to a more efficient double delta wing on the orbiter. Also, a newly redesigned ET, which could be separated from the vehicle before orbital velocity was reached, would eliminate the need for a solid-fueled rocket deorbit motor on the nose of	A&A(1973)

DATE	EVENT	SOURCE
73/04/16	the tank. The SRBs were also redesigned for lighter weight.	
73/04/17	NASA announced the signing of a definitive contract with RIC Space Division for design, development, and production of the orbiter vehicle and for the integration of all Shuttle system elements. The cost-reimbursement, fixed-fee, and award-fee contract would have a \$477,400,000 initial increment. The contract superseded a 9 August 1972 letter contract and would continue through 3 August 1974. A second work increment--the balance of design, development, test, and evaluation, plus delivery of two orbiters--was planned to begin 4 August 1974. RIC planned to subcontract to firms and suppliers in almost every state.	A&A(1973)
73/05/02	JSC announced the award of a \$1,947,000 cost-plus-fixed-fee contract to Chrysler to distribute and document wind tunnel data for Shuttle development.	A&A(1973)
73/05/31	Receipt of proposals for design, development, test, and evaluation of the ET from MDAC, Boeing, MMC Aerospace Division, and Chrysler's Space Division was announced by MSFC. The contract, calling for three ground test tanks and six developmental flight tanks in the development phase, was expected to be awarded by 1 August.	A&A(1973)
73/06/00	In an article in AIAA's ASTRONAUTICS AND AERONAUTICS, Robert Salkeld of the System Development Corporation and Rudi Beichel of the Aerojet Liquid Rocket Company suggested the feasibility and desirability of reusable single stage shuttles. These single stage shuttles included: horizontal takeoff, horizontal landing shuttles (HTOHL); vertical takeoff, horizontal landing shuttles (VTOHL); and vertical takeoff, vertical landing shuttles (VTOVL). In the article, preliminary studies indicated that of the three, the VTOHL had more advantages technically, operationally, and economically. In an accompanying editorial, A. V. Cleaver said, "I do not believe that the current NASA concept of a space shuttle will realize the desired large improvement in the economics of transporting payloads into close Earth orbits. ...the politicians, as so often, made a false move when they tried to save money in the short-term."	AIAA-A&A-Vol.11-No.6
73/06/18	Rockwell International, Space Division, announced the award of a \$30-million-plus subcontract to LTV Aerospace, Vought Systems Division, to design and develop the leading-edge structural subsystem of the orbiter's thermal protection system. Final details were being negotiated.	A&A(1973)
73/06/26	JSC's selection of Pratt & Whitney's TF33-P-7 engine for use on the orbiter in atmospheric flight was announced by NASA. The engine was similar to those used on the AF C-141 Starlifter transport aircraft. The USAF would secure 25 engines for NASA use during horizontal flight-testing of the orbiter and for ferry flight when the Space Shuttle was operational.	A&A(1973)
73/07/16	MSFC issued a request for proposals for SRM development to Aerojet Solid Propulsion, Lockheed Propulsion, Thiokol Chemical, and UTC. Technical proposals were due 27 August and cost proposals 30 August. The program would include: increments for design, development, and test (including production of sufficient hardware for six development flights); for production of new and refurbished SRMs for 54 flights; and for delivery of new and refurbished units for 385 flights.	A&A(1973)
73/07/23	President Nixon signed HR 7528, NASA's \$3.065 billion FY74 authorization, into Public Law 93-74. Approved by the House/Senate Conference Committee on 28	A&A(1973)

DATE	EVENT	SOURCE
73/07/23	June, by the House on 23 May, and by the Senate on 19 June, the bill provided \$2.246 billion for research and development, \$112 million for construction of facilities, and \$707 million for research and program management.	
73/08/03	MSFC announced the receipt of proposals from five firms for a contract for design, procurement, fabrication, installation, and checkout of a data acquisition system to support Shuttle structural testing. The firms were AVCO, CSC, GAC, Systems Engineering Laboratories, and Wyle Laboratories. The contract would be awarded in October.	A&A(1973)
73/08/14	An Intergovernmental Agreement on U.S. and European cooperation in Shuttle development was signed in Paris by the U.S., Belgium, France, West Germany, Switzerland, and the United Kingdom. The agreement included European funding and development of the Spacelab. A NASA-European Space Research Organization (ESRO) Memorandum of Understanding that supplemented the agreement was initialed by NASA and ESRO representatives in Europe. The memorandum would be signed in Washington, D.C., on 24 September by Dr. James C. Fletcher, NASA Administrator, and Dr. Alexander Hocker, ESRO Director General.	A&A(1973)
73/08/16	NASA announced the selection of MMC for negotiation of a \$107-million cost-plus-award-fee contract for the design, development, test, and evaluation of the ET. The development phase would include fabrication of three ground test tanks and six developmental flight tanks. The contract would run through 1978.	A&A(1973)
73/08/27	NASA's Manned Spacecraft Center was officially rededicated as Lyndon B. Johnson Space Center (JSC) in ceremonies at the facility. Dr. James C. Fletcher, Texas Governor Dolph Briscoe, and Mrs. Lyndon B. Johnson attended. A bust of the late President was unveiled. President Nixon had signed the law making the name change 17 February. President Johnson died 22 January.	A&A(1973)
73/08/31	Proposals for SRM development had been received from Aerojet Solid Propulsion, Lockheed Propulsion, Thiokol Chemical, and UTC, MSFC announced. The SRM program would be conducted in three increments: design, development, and test, ending in September 1979; production of new and refurbished SRMs for 54 flights (108 units) beginning early in 1978; and delivery of new and refurbished units for 385 flights (770 units) beginning in July 1980.	A&A(1973)
73/09/01	NASA had awarded a \$152,565,000 cost-plus-award-fee contract to MMC for the design, development, and test of the ET, MSFC announced. The contract, which covered the first increment of the ET project from 1 September 1973 to 30 June 1980, called for a maximum production rate of 24 tanks per year and delivery of major ground-test articles and six flight model tanks. The work would be done at the Michoud Assembly Facility under the direction of MSFC.	A&A(1975)
73/10/30	Dr. James C. Fletcher, NASA Administrator, testified 30 October on Shuttle status in hearings before the Senate Committee on Aeronautical and Space Sciences. Dr. Fletcher testified that the prime contractor for the ET had been selected and that NASA was in the process of selecting the SRM contractor. When the SRM prime contractor was selected, the Shuttle prime contractor selection would be complete, with the exception of the SRB integration contractor. NASA and DOD were in the final phase of a joint study to determine the most efficient development method for the Space tug for high energy orbit missions. A study of the number and kinds of payloads that could be carried on the Shuttle was presented. A description of the types of payloads anticipated was included in	A&A(1973)

DATE	EVENT	SOURCE
73/10/30	the report. Dr. Fletcher's testimony concluded on 31 October.	
73/11/05	The return payload limit on the orbiter had been increased 28%, up from 11,300 kg to 14,500 kg, following system analysis by RIC, AVIATION WEEK & SPACE TECHNOLOGY reported. By permitting the orbiter to land at a faster speed, the increase could be made without modifying the orbiter structure and without exceeding the 68,000-kg liftoff weight limit.	A&A(1973)
73/11/20	MSFC was drop testing the SRB scale model and a three-parachute recovery system to determine the feasibility of keeping parachutes attached to the SRB rather than releasing them on impact with the water.	A&A(1973)
	NASA announced the selection of Thiokol Corporation for negotiation of a \$106-million, cost-plus-award-fee contract for design, development, test, and evaluation of the SRMs. The 6-year contract would run through September 1979.	A&A(1973); NHDB-Vol.3
74/01/09	Lockheed Propulsion asked the GAO to set aside NASA's 20 November 1973 selection of Thiokol Chemical for negotiation of a \$106-million contract to design and develop the SRM. Lockheed charged that it had an edge in the technical evaluation of the engine and that it had been the low bidder before NASA had made "improper adjustments" in its bid. Lockheed also maintained Thiokol's transportation costs from Utah to Florida would be higher and that Thiokol's proposed design would not meet program objectives without major revision.	A&A(1974)
74/02/08	The Army was issuing a \$1,988,000 firm-fixed-price contract to Algernon Blair Industrial Contractors for modifications to orbiter propulsion system test facilities for SSME testing at NASA's Mississippi Test Facility, DOD announced.	A&A(1974)
74/02/13	MSFC awarded a 90-day \$950,000 cost-plus-fixed-fee contract to Thiokol Chemical for studies, analysis, planning, and design required to define the interface and performance relationships of the SRM to the SRB, ET, and orbiter. Award of the 90-day contract was necessary to continue the overall development schedule of the total Shuttle system. A contract award to Thiokol in November 1973 to develop the motors for the Shuttle had been delayed pending the resolution of a protest filed by Lockheed Propulsion.	A&A(1974)
74/03/00	In an article in AIAA's ASTRONAUTICS AND AERONAUTICS, Robert Skalfeld, System Development Corporation, presented figures indicating that single stage shuttles would reduce the costs of delivering payload to orbit to less than \$100 per pound for surface launch. "This would represent nearly a tenfold improvement over current launch vehicles." In addition, Skalfeld stated that single stage shuttles could "be based almost entirely on shuttle technologies which [had] already been funded" and which were then under development.	AIAA-A&A-Vol.12-No.3
74/03/05	Major reorganizations were announced at NASA Headquarters and MSFC by Dr. James C. Fletcher, NASA Administrator, and Dr. Rocco A. Petrone, MSFC Director. Dr. Petrone said that the reorganization, effective 30 May, would enable MSFC to fulfill requirements of its varied assigned programs and improve its competitive position to obtain new assignments. The major changes occurred in the restructuring of the S&E Directorate. Also included in the reorganization effort were changes in MSFC's A&PS Directorate. Offices under A&PS would now include Technology Utilization, Manpower, Financial Management, Facilities, Procurement, Management, Services, Logistics, and Computer Services.	A&A(1974)

DATE	EVENT	SOURCE
74/03/23	Key appointments in the Shuttle program at MSFC became effective. Robert E. Lindstrom became Space Shuttle Manager, replacing Roy E. Godfrey who became Special Assistant to the MSFC Director. In the Shuttle Office James R. Thompson became SSME Project Manager, John A. Chambers became SSME Deputy Manager, and Frank M. Stewart became Technical Assistant to the Shuttle Projects Office Manager.	A&A(1974)
74/04/01	Construction of the \$22 million runway for Shuttle began at KSC after a brief ground-breaking ceremony at the construction site northwest of the Vehicle Assembly Building. The 90-m wide, 4600-m long, 40-cm thick runway would accommodate a 75,000-kg spacecraft returning from space at a 15-20 degree angle and at a speed of nearly 295 kph. More than 8000 km of grooves in the surface would permit drainage and prevent hydroplaning while landing in the rain. To reduce the speed of the returning Shuttle, astronauts would have the help of brakes, parachutes, and a net at the end of the runway. Completion of the runway was slated for July 1976.	A&A(1974)
74/04/08	NASA announced selection of McDonnell Douglas to negotiate a 2-year, \$13.2-million, cost-plus-award-fee contract to support the Shuttle program in: system analysis; avionics system engineering; mission planning, analysis and software formulation; computer systems and software; and crew procedures and flight planning.	A&A(1974)
74/04/17	MSFC had awarded a \$3,850,000 contract modification to RIC for architectural and engineering services and construction of test and industrial facilities for the SSME, NASA announced. This latest modification brought the total dollar value of the original contract to \$60.6 million.	A&A(1974)
74/04/26	KSC announced that NASA had awarded Planning Research Corp., Huntsville, AL, a 1-year, \$6-million, cost-plus-fixed-fee contract with an additional 1-year, \$10-million option to provide design engineering support services for development, test, and mission operations. The contract would primarily support Space Shuttle operations at Kennedy Space Center.	A&A(1974)
74/05/08	John Finley Yardley was named Associate Administrator for Manned Space Flight. He succeeded Dale D. Myers who left the agency to return to private industry. In this position, Yardley would direct NASA's manned flight programs, including the Space Shuttle, the US-USSR Apollo Soyuz Test Project, and the U.S.'s responsibilities in Spacelab. Yardley had been Vice President and General Manager of the Eastern Division, Astronautics for the McDonnell Douglas Corporation since 1972. He would report to his new post on 20 May 1974.	NASA-Rel-74-123
74/05/15	MSFC had requested proposals for two space tug studies, MSFC announced. The first study was to develop schedules, controls, and planning data for the space tug program from initial flight readiness to long-term mission operation. The second study was to recommend a space tug avionics system, with emphasis on rendezvous and docking avionics and data management subsystem requirements and configuration.	A&A(1974)
74/05/17	NASA announced the selection of IBM for an \$11-million, 2-year, cost-plus-fixed-fee contract to design, develop, and implement a ground-based computing and data-processing system for the Space Shuttle and other programs.	A&A(1974)
74/05/20	NASA announced a 45-day, \$500,000 continuation of a 13 February contract	A&A(1974)

DATE	EVENT	SOURCE
74/05/20	with Thiokol Chemical for the SRM design study. In addition to the original contract requirements, the continuation contract required that Thiokol assist NASA in identifying materials independent of the specific final motor design that had long-lead-time supply times.	
74/06/00	United Technology Center submitted an unsolicited proposal to be a backup contractor to Thiokol in the solid rocket motor program.	NHDB-Vol.3
74/06/14	Dr. James C. Fletcher announced that NASA's Mississippi Test Facility had been renamed the National Space Technology Laboratories (NSTL), effective immediately, and would become a permanent field installation reporting directly to NASA Headquarters. MTF, whose activities now included developmental testing of the SSME and an earth resources laboratory, had been established in 1961 as part of MSFC to perform static tests of Saturn V launch vehicle stages used in the Apollo program.	A&A(1974)
74/06/17	Dr. William R. Lucas assumed duties as Director of MSFC succeeding Dr. Rocco A. Petrone, who had been transferred to NASA Headquarters as Associate Administrator. Dr. Lucas, who had been with MSFC and predecessor organizations for 22 years in scientific and management positions, had been part of the group transferred from the Army in 1960 to form the nucleus of MSFC. He had served as Deputy Director since 1971.	A&A(1974)
	NASA announced plans to use a Boeing 747 to transport the Shuttle orbiter and related hardware cross country. The 747 would also be used in the planned approach and landing tests of the reusable orbiter. This new concept replaced earlier plans to install six airbreathing engines on the delta-winged orbiter for flight testing and for ferry flights. A used 747-100 type aircraft would be acquired from American Airlines. Cost of the aircraft was estimated at \$16 million. The 747 would be modified and equipped with permanent fittings permitting quick installation of an orbiter or other Shuttle hardware atop the aircraft.	NASA-Rel-74-160
74/06/18	MSFC announced the award of a \$69,316, 6-month contract to ITT Gilfillan Division to analyze a two-way optical data link using laser beams and operating between the ground and payloads in low earth orbit. The study, which could lead to a laser communications system for the Shuttle, was expected to provide information on the most effective lasers and frequencies and the effects of orbital dynamics.	A&A(1974)
74/06/22	President Nixon signed NASA's authorization bill, H.R. 13998, into Public Law 93-316. The \$3.267-billion act authorized \$2.37 billion for research and development, \$144 million for construction of facilities, and \$750 million for research and program management.	A&A(1974)
74/06/27	Dr. James C. Fletcher, NASA Administrator, announced his decision to immediately award Thiokol a \$5.5-million, 180-day SRM development letter contract. The definitive contract would be awarded later. Lockheed Propulsion had brought a protest to the GAO concerning the original 20 November 1973 contract award to Thiokol. GAO validated NASA's selection procedures on 24 June. GAO stated, however, that the NASA cost analysis had contained an overstatement of the cost differential favoring Thiokol's proposal over Lockheed's. The GAO recommended that the NASA Administrator determine whether the award should be reconsidered. Dr. Fletcher advised the Comptroller General that the decision to	NASA-Rel-74-178; NASA-Rel-74-180

DATE	EVENT	SOURCE
74/06/27	proceed with Thiokol was based on the conclusion that the rationale used for the initial selection remained valid.	
74/07/11	NASA announced the award of a \$483,000,000, cost-plus-fixed-and-award-fee supplemental contract and 11-month contract extension to RIC Space Division for development of the orbiter and integration of all elements of the Space Shuttle. The supplement brought the total value of the contract, which would continue through 30 June 1975, to \$943,248,000. Rockwell was to subcontract more than 50% of the dollar value of the contract.	A&A(1974)
74/07/26	MSFC announced the award of six contracts, totaling \$1.8 million, for development studies of the interim upper stage (IUS) and space tug. The IUS--a predecessor to the space tug to be used with the Shuttle by DOD and NASA until the more sophisticated and capable tug was ready for use in 1983--was being developed as the orbit-to-orbit stage (OOS) by the USAF. Two contracts to GDC (including one to the Convair Division), one to UAC Pratt & Whitney Division, one to MMC, one to MDAC, and one contract to IBM were included in the announcement.	A&A(1974)
74/08/28	MMC had been awarded a \$26,453,600 NASA contract for support of the ET effort, NASA announced. The consolidated facilities contract, which would run through 31 August 1978, provided for the acquisition of plant equipment at MAF, rehabilitation of existing facilities, and construction, modification, maintenance, and repair of facilities.	A&A(1974)
74/09/11	Lockheed had received a \$25-million letter contract from RIC for structural testing of the orbiter, the HUNTSVILLE TIMES reported.	A&A(1974)
74/10/01	The Shuttle Operational Management Assessment Team was formed to make "an appraisal of the technical aspects of the program and an assessment of the ability of management to complete the development of the shuttle within the cost and performance targets." Composed primarily of industry representatives and named for its chairman, Willis M. Hawkins of Lockheed Aircraft, the Hawkins Committee was to prepare a formal briefing no later than 1 November 1974. Inflation levels of 8-9%, over the 5% on which FY 1975 funding was based, had increased costs throughout the Shuttle program and compromised the ability of NASA and the prime contractors to reach their program milestones.	A&A(1974)
74/10/18	The first few Shuttle flights would land at FRC, Dr. James Fletcher, NASA Administrator, announced in a talk before the Antelope Valley Board of Trade, Lancaster, CA. The first horizontal test flights would be made from FRC and the first orbital test flights would return there because of added safety margins and good weather conditions. FRC would also be a secondary landing site for operational Space Shuttle flights when weather or other conditions made it desirable.	A&A(1974)
74/11/19	Wind Tunnel tests of 4% scale models of the orbiter had begun at Air Force Systems Command's AEDC, the Air Force announced. The tests of heat buildup on the forward half of the orbiter during the critical period of reentry and at other points in the flight trajectory were scheduled to continue through the remainder of the year. The 4% model, the fourth size to be tested in the AEDC tunnels, reflected the latest design details on the forward half of the orbiter.	A&A(1974)
74/12/04	The Shuttle Cost & Review Committee recommended program changes to reduce	A&A(1974)

DATE	EVENT	SOURCE
74/12/04	costs and reported design changes made necessary by thermal weight constraints to NASA Administrator Dr. James C. Fletcher. The committee suggestions included: delay of the second flight; refurbishment of the first test orbiter; a deferral of 3 months to 2 years for components of the second launch complex at KSC; and delay in the development of spacesuits and portable life support systems for extravehicular activities from Shuttle using instead the Apollo-style hardware. Emergency barriers on runways and a building at KSC for installing fairings and parachutes on SRMs were judged unnecessary. Some tests were recommended for cancellation. Design changes included: payload doors of a graphite epoxy composite that expand less when heated and weigh 400kg less than the aluminum composite originally planned for use; and switching to a better thermal coating.	
74/12/23	MSFC announced the award of a two-phase planning study contract for the STS to MDAC. Phase 1, funded at \$116,214.00 for 6 months, would define a master scheduling concept for the effective use of the Shuttle, interim upper stage, space tug, and Spacelab. Phase 2, funded at \$183,240.00 for an additional 9 months, would validate a master planning technique and establish specifications for scheduling.	A&A(1974)
75/01/00	MSFC awarded two construction contracts to the Army Corps of Engineers. The first contract, for \$2 million, was for construction of the SRB structural test facility at MSFC. The second contract, for \$2.93 million, was for construction of and modification to the dynamic test facility used in vibration testing of the Shuttle in a vertical position.	A&A(1975)
75/01/17	A request for proposals for integrated electronic assemblies (IEA) for the SRB had been issued by MSFC, MSFC announced. The proposals would be for design, development, test and evaluation, fabrication, and assembly of 33 IEAs. The Shuttle would carry two refurbishable IEAs, one forward and one aft, to route commands from the orbiter to the thrust vector control system to release the nosecap and frustum, jettison the SRM nozzle, detach parachutes, and turn on the recovery aids.	A&A(1975)
75/01/28	Lee R. Scherer assumed the duties of Director of KSC, succeeding Dr. Kurt H. Debus, who retired in October 1974. Scherer had been Flight Research Center Director since 1971 and, before that, Assistant Director for Lunar Programs and manager of the Lunar Orbiter program at NASA Headquarters.	A&A(1975)
75/02/23	Dr. David L. Winter, NASA Director for Life Sciences, announced during a press briefing that the physical criteria for Shuttle astronauts would vary according to function. Pilots would be selected using very rigid criteria which would not be imposed upon mission specialists. Because the objective for missions would be to get the best qualified scientists, it would be impossible to predict what size, shape, age, or sex these scientists would be. The purpose of the Shuttle was to permit anyone with a legitimate need to go into space to do so; therefore, NASA's approach would be to broaden the selection criteria as much as possible.	A&A(1975)
75/02/24	Shuttle Program Deputy Director LeRoy E. Day summarized the progress of the orbiter to the Canadian Science Writers Association in Toronto. NASA and its contractors were making steady progress, staying within cost and schedule commitments. The first orbiter would be rolled out in 1976, with its first captive flight on the back of the Boeing 747 aircraft scheduled for the second quarter of 1977. Initial component engine firings were completed during 1974.	A&A(1975)

DATE	EVENT	SOURCE
75/02/24	Firings of the first integrated subsystems test bed engine were scheduled for July.	
75/02/28	The preliminary design review of Orbiter 102, to be used in the first manned orbital flight, was completed on schedule.	A&A(1975)
75/03/24	Assembly of the SSME had been completed by RIC Rocketdyne one month ahead of schedule, NASA announced. After assembly the engine was automatically checked out--for the first time in history--by the engine's internal controller and integral digital computers for functional, electrical, and mechanical operations. Known as the Integrated Subsystems Test Bed, this engine was not built for flight but for static firing tests at NSTL.	A&A(1975)
75/03/25	Two SRBs on the acoustic model accidentally escaped from the test stand during a captive static firing. The model's liquid propellant rocket engines had operated safely for a few seconds when the two SRBs ignited on schedule. Both SRBs then separated from the test stand. One was propelled north for 1.2 km, landing in a pine thicket. A brush fire caused by the rocket was quickly extinguished and no one was injured. A nine-member board was appointed to investigate the cause of the accident, determine the amount of property damage, investigate the adequacy of safeguards to prevent further incidents, recommend corrective measures, and assure containment of facilities and surrounding areas in case of a recurrence. Although the test stand was damaged, the orbiter and ET of the model were not. The model would be returned to operation with the replacement of some wiring and instrumentation.	A&A(1975)
75/04/01	MSFC issued a single-source request to Sunstrand Corporation to submit a proposal for the design, development, manufacture, test, and delivery of the auxiliary power unit for the SRB's thrust vector control subsystem. The APU would include a gas generator, turbine, gearbox, fuel pump, electrical controls, control valves, instrumentation, mounting system, and the mechanical and electrical connections required to interface with other SRB subsystems. Two APUs would be used during prelaunch and ascent phases of flight to provide hydraulic power to the thrust-vector control system of each booster.	A&A(1975)
	The prototype of a flexible tunnel to connect the Shuttle airlock with the forward end of Spacelab was being tested at MSFC. The tunnel would provide a pressurized passageway for crew members and scientists to move to and from the orbiting laboratory without spacesuits. The flexible circular tunnel, built by Goodyear Rubber, would accordion-fold to .6 m and extend to a length of more than 4.3 m. Made rigid by steel rings, the tunnel was constructed of layers of aluminum foil, Capran film, and nylon covered by a spongy meteoroid shield. MSFC engineers were testing the tunnel, which would be exposed to the space environment when the orbiter bay doors were opened, for structural strength, airtight integrity, and materials compatibility.	A&A(1975)
75/04/09	NASA announced that Dr. Rocco Petrone, former MSFC Director, was leaving as Associate Administrator of NASA to join the National Center for Resource Recovery as President and Chief Executive Officer. Dr. Petrone's resignation was effective as of May 1975.	NASA-Rel-75-98
75/04/10	The first Shuttle ground test hardware, a hydraulic actuator for the SSME, had arrived at MSFC for functional checkout, MSFC announced. Each of the orbiter's three main engines would use two of the actuators to gimbal the engine	A&A(1975)

DATE	EVENT	SOURCE
75/04/10	for steering control. After checkout the actuator--one of eight to be tested--would be sent to NSTL where the SSMEs would be tested.	
75/05/06	RIC, holder of the prime contract with NASA to build the orbiter, announced that more than \$109 million in subcontracts for the SSME had been awarded by the Rocketdyne Division since work on the engine began in 1972. Figures showed that firms in 40 states were participating in the Shuttle program. Rockwell reported that Space Shuttle development would funnel an estimated \$5 billion into the U.S. economy by 1978 and create employment for approximately 50,000 workers.	A&A(1975)
75/05/15	NASA had awarded a definitive \$140,577,924 SRM contract to Thiokol, Wasatch Division, MSFC announced. A previous letter contract issued 26 June 1974 had given Thiokol authority to proceed with the work which included design, development, testing, and evaluation of the SRM. The contracts also called for Thiokol to provide support equipment, tooling and support parts, systems integration support and special studies, and data and documentation.	A&A(1975)
75/05/27	A 1/3 scale model of the orbiter was tested in ARC's 40- by 80-ft wind tunnel to gather low-speed flight data in support of approach and landing tests of the first full-scale orbiter at FRC in 1977. In addition, data were gathered to calibrate the vehicle's air data probes. The model, built by prime contractor RIC, was 13.1 m long and weighed 20,400 kg. Additional wind tunnel tests were scheduled for November 1975 and February 1976.	A&A(1975)
75/06/04	MSFC announced the selection of Bendix, Guidance Systems Division, for negotiations leading to a contract for integrated electronic assemblies for the SRB. The cost-plus-incentive-fee contract would cover design, development, test and evaluation, and fabrication of assemblies and assorted test equipment for the first six Shuttle flights. The initial contract would call for 33 units, including flight articles, spares, and development and test versions, with delivery to begin in 1976.	A&A(1975)
75/06/07	RIC Rocketdyne successfully conducted the first ignition test of the Integrated Subsystem Test Bed engine at NSTL. The test, conducted for MSFC, lasted for .8 seconds. It was the first of a series of eight ignition tests leading up to the firing of the SSME. Initial evaluation of data indicated that all the test parameters were satisfactory and that the test objective was achieved. All ignition tests would be of short duration, none reaching full engine thrust.	A&A(1975)
75/06/11	MSFC announced the award of a \$3.2-million contract by ET prime contractor MMC Aerospace to Avco, Aerostructures Division, to manufacture the intertank section of the ET. The intertank would provide support between the liquid oxygen tank and the larger liquid hydrogen tank. The disposable ET, 47 m long and 8.4 m in diameter, would carry liquid propellant for the three SSMEs.	A&A(1975)
75/06/18	MSFC announced the award of two contracts for parallel studies on space processing equipment for Shuttle and Spacelab missions. TRW Systems Group was awarded \$29,981 and GE was awarded \$284,974 to provide preliminary designs for equipment that could be used to process various materials, such as metals and crystals, in space.	A&A(1975)
75/06/19	House Committee on Appropriations reported out H.R. 8070, the Department of Housing and Urban Development/Independent Agencies Appropriations Bill for	A&A(1975)

DATE	EVENT	SOURCE
75/06/19	FY76. The committee proposed the continuation of the Shuttle project. No new starts were proposed.	
75/06/24	<p>RIC Rocketdyne Division successfully test fired the SSME main chamber for the first time at NSTL. Initial evaluation of ignition test data indicated that all test objectives were achieved. During a second firing, the engine's high-pressure fuel pump reached a maximum speed of almost 7000 rpm, 19% of full power. The test was the seventh in a planned series of 10 to 15 short-duration ignition tests that began 11 June and would culminate in the operation of the engine at 20% of maximum thrust level of 2,090,664 newtons (470,000 lbs.). Subsequent tests would attempt higher mainstage thrust levels to evaluate engine-starting characteristics and performance.</p>	A&A(1975)
	<p>The Air Force System Command announced that Arnold Engineering Development Center was developing a technique to study, under flight conditions, the physical behavior of the spray-on insulating material proposed for the Shuttle. Using procedures similar to those used in analyzing aerial photographs, a series of reference lines was projected onto the original surface and photographed before wind tunnel testing. The same pattern was then projected onto the surface during the testing. The shift in the apparent position of the projected lines as the surface eroded from the position shown on the original photograph allowed analysis of the behavior of the materials.</p>	A&A(1975)
75/06/30	<p>NASA announced the award of a \$287-million contract to Air Products and Chemicals to supply liquid hydrogen for NASA's East Coast requirements over a 12.5-year period beginning 1 July 1975. The liquid hydrogen would be used primarily for SSME testing at NSTL and Shuttle launches at KSC.</p>	A&A(1975)
75/07/01	<p>AEDC was studying the feasibility of the secondary burning--called external burning--of fuel rich exhaust to increase the efficiency of SRMs. The concept called for the diversion of the exhaust of burning propellant through ports that ring the rear end of the motor casing, and its injection at right angles into the airstream. Miniature nozzles in each port would accelerate the exhaust gas to sonic speed. Turbulent rising of the fuel-rich sonic gas and the supersonic airflow would cause a secondary combustion, increasing pressure at the base of the motor and overall thrust of the propulsion system.</p>	A&A(1975)
	<p>MSFC observed the 15th anniversary of the transfer of personnel, facilities, and responsibilities from ABMA to NASA. The Center had been formally dedicated at a ceremony on 8 September 1960. In a message to MSFC Director Dr. William R. Lucas, President Gerald R. Ford said that "From its inception, the Marshall center has continued in the forefront of this Nation's tremendous advancement in the exploration of space. We look forward to more vital contributions...from the Marshall center in the years ahead as the United States continues to lead the way in using space for the benefit of all mankind."</p>	A&A(1975)
	<p>Potential Shuttle propellants had been tested at an underground facility at AEDC, the Air Force Systems Command reported. Testing was part of a selection process to find a compatible propellant for the auxiliary motors that would separate the orbiter from the SRBs. Three candidate propellants were tested at a simulated altitude of 40,000 m. Reusable ballistic test evaluation system motors, each loaded with 45 kg of propellant, were fired seven times, burning for 2 seconds and generating 53,400 newtons of thrust. Exhaust plumes were directed at 15- by 15-cm tiles of thermal protective material at various</p>	A&A(1975)

DATE	EVENT	SOURCE
75/07/01	distances and angles. After the tests, the tiles were checked for erosion of the surfaces and edges. Pressure and temperature were measured in the rocket plumes, and surface temperatures and heating rates were measured on 21 selected material samples. All data and samples were sent to MSFC for analysis.	
75/07/09	MSFC announced award of two contracts for 356 aluminum hand forgings for SRBs. A \$465,935 contract went to the Aluminum Co. of America and \$62,900 went to Weber Metals and Supply Co. for forward skirt thrust post fittings, inboard aft skirt actuator support brackets, aft skirt splice fittings, and aft skirt holddown posts.	A&A(1975)
75/07/11	MSFC announced the award of a \$5,768,612 cost-plus-incentive-fee contract to Sperry Rand Corporation for design, development, test, and delivery of 37 multiplexer-demultiplexers (MDM) for the SRBs. The MDM, an electronic device that permits sending or receiving more than one message, signal, or unit of information on a single communication channel, was housed in the SRB's integrated electronics assembly. It would process signals for such functions as ignition, thrust vector control, release of nose cap and frustum, jettison of SRM nozzles, detachment of parachutes, and turn-on of recovery aids.	A&A(1975)
75/07/30	NASA announced its selection of Martin Marietta, Denver Division, for the award of a cost-plus-award-fee contract for the Checkout, Control, and Monitor Subsystem (CCMS) hardware for the Launch Processing System in support of the Shuttle. The total estimated cost and fee for this contract was approximately \$22.8 million. The CCMS consisted of hardware assembly configurations communicating directly with computers and with the flight and ground equipment of the Space Shuttle.	NASA-Rel-75-219
75/08/06	NASA announced that KSC awarded an \$18,749,000 contract for modification of Pad A in Complex 39 and conversion of a Mobile Launcher to a Mobile Launcher Platform for Space Shuttle operations to Blount Brothers Construction, Montgomery, Alabama. Pad A would be the launch site of all early Shuttle missions with Pad B to be modified later.	NASA-Rel-75-227
75/08/07	MSFC announced the selection of United Technologies for negotiation of a fixed-price contract of \$1.775 million for solid propellant booster separation motors (BSM) for use on the first six development flights in the Shuttle program, beginning in 1979. The BSMs would separate the two reusable SRBs--each SRB requiring eight BSMs, four forward and four aft--approximately 110 seconds after launch.	A&A(1975)
75/08/19	MSFC announced the award of a \$1.9-million firm-fixed-price contract to MMC for fabrication, acceptance testing, and delivery of 322 pyrotechnic initiator controllers (PIC) for the SRB.	A&A(1975)
75/08/22	NASA announced the selection of MDAC for negotiation of a \$14.9-million fixed-price-incentive contract to develop, build, and deliver SRB structures, and to design and build the tooling necessary to produce them. The SRB structures would support the Shuttle on the launch pad, transfer thrust loading to the orbiter and external tank, and provide structural support for the SRB recovery system, electrical components, and thrust-vector control system.	A&A(1975)
75/09/02	MSFC announced the award of a \$4,409,000 cost-plus-incentive-fee contract to Bendix for design, development, test and evaluation, and fabrication of	A&A(1975)

DATE	EVENT	SOURCE
75/09/02	integrated electronic assemblies (IEA) for the SRBs on the first six developmental flights. Each booster would require two IEAs. The forward IEA would initiate release of the nose cap and frustum, jettison the SRM nozzle, detach the parachute, and turn on recovery aids. The aft IEA would interface with the orbiter, the forward IEA, and other avionic systems. Delivery of the IEAs would begin in 1976 and continue through 1 April 1979.	
75/09/10	Engineers at MSFC completed tests seeking to refine the means of towing recovered SRBs to shore for refurbishment and reuse. These tests explored the question of whether the parachute recovery lines and riser lines would, when under tension during descent, stretch enough to develop sufficient latent energy to deploy the 52 mm diameter and 15 m long tow rope from a tray located in the SRB's forward skirt. The recovery systems parachutes would be fitted with flotation devices so they could be recovered. On the first six developmental flights, the set of parachutes would be cut free from one booster in each set of boosters, and both configurations would be tested to determine which made it easier to retrieve and tow the SRB.	A&A(1975)
75/09/17	One of the most highly detailed and instrumented models of the Shuttle ever constructed had been wind tunnel tested at Arnold Engineering Development Center, AFSC announced. Located throughout the 92-cm model were 835 temperature sensors to measure heat levels of major components at jettison of the expended SRBs. Two other tests also had been completed for NASA at AEDC: a smaller model and computer-controlled system were used to study aerodynamic forces generated during the separation of the expended SRBs; heating data were obtained on an orbiter model positioned at a high angle of attack at Mach 8.	A&A(1975)
75/09/28	Transfer of the Launch Vehicle and Propulsion Program from the Office of Space Science to the Office of Manned Space Flight and transfer of the NASA Directorate for Life Sciences from the Office of Manned Space Flight to the Office of Space Science became effective. The name of the Office of Manned Space Flight was changed to the Office of Space Flight, and the name of the Launch Vehicle and Propulsion Program was changed to the Expendable Launch Vehicle Programs.	A&A(1975)
75/09/29	JSC announced that the first of two Shuttle training aircraft was test flown at Grumman Aviation's Bethpage, NY, plant. The modified Gulfstream II would be used to train crews for orbiter descent and landing procedures. The cockpit layout and the aerodynamic modifications of the trainers provided motion and visual cues and handling qualities similar to those of the actual orbiter. The two trainers would be delivered to JSC early in 1976.	A&A(1975)
75/09/30	MSFC announced that acoustic testing had been resumed of a 6.4% scale model of the Shuttle to provide information needed in designing the Shuttle and its launch facilities. The tests would also produce data on effects of hot exhaust gases on the aft portion of the Shuttle shortly after ignition. Data from earlier testing of the model, which included the liquid-fueled engines and SRMs, had alerted designers that special provisions would be needed to deflect hot gases out of the SRBs away from the facility fuel lines near the launch pad. A pad design based on this analysis had been tested and proven. During the tests, which had begun originally in August 1974, the model was held in a test stand while its engines were fired from 6 to 10 seconds.	A&A(1975)
75/10/01	NASA and RIC Space Division signed a \$1.8-billion supplemental agreement	A&A(1975)

DATE	EVENT	SOURCE
75/10/01	for the follow-up development of the orbiter, NASA announced. The agreement formally incorporated into an existing contract the construction of Orbiters 101 and 102, approach and landing tests, and six orbital flight tests. The supplemental agreement for the additional work brought the value of the Rockwell contract to more than \$2.7 billion.	
75/10/17	The first SSME mainstage test was performed at NSTL.	RIC-Chron
75/10/18	Senator William Proxmire (D-WI) charged that Rockwell International, holder of a \$6.4 billion NASA contract to develop a space shuttle, had entertained NASA employees. This information was brought out in a Senate investigation of DOD/contractor improprieties.	FACTS-ON-FILE,1975,961F1
75/10/30	MSFC announced that the Saturn V dynamic test stand at MSFC was being modified under a \$1,923,000 contract between the Army Corps of Engineers and Universal Construction to provide a Mated Ground Vibration Test Facility. The 123-m-high structure would be used to test the vehicle in launch and boost configuration, to determine the bending modes and dynamic response during launch and ascent conditions.	A&A(1975)
75/10/31	MSFC announced the selection of Moog, Inc., for a \$6,685,584 cost-plus-incentive-fee/award fee contract to design, produce, test and maintain the SRB Thrust Vector Control (TVC) electrohydraulic servoactuators. The devices would move the SRB exhaust nozzle, providing directional control by gimballing the nozzle during propellant burn.	A&A(1975)
75/11/00	NASA officials decided to use the vehicle assembly building at launch complex 39 at KSC to assemble the SRBs.	NHDB-Vol.3
75/11/18	Boeing, which had a 44-month \$3-million subcontract from RIC to detect electrical problems with the Space Shuttle, reported that 35 design or hardware changes had been necessary in the SSME electrical circuits thus far. Boeing was conducting a sneak circuit analysis of the first orbiter, to be used for approach and landing tests. Later studies were scheduled for the second orbiter, the SRB, and the ET, as well as critical ground-support equipment.	A&A(1975)
75/12/10	A long-duration free-flying manned space station in earth orbit appeared to be the most economical way of providing a continuing manned presence in space, according to "Manned Orbital Systems Concepts," a study conducted for MSFC by MDAC. A station that could significantly extend the time in space planned for the Shuttle would offer advantages for doing a given amount of work with fewer flights and reducing the number of turnarounds, checkouts and similar operations. A permanent facility could offer maintenance and repair and even reconfiguration of payloads. The study concluded that problems anticipated by the world in the 1990s should be solved in the 1980s, and that an extended-duration manned orbital facility could contribute significantly to those solutions.	A&A(1975)
	MSFC announced it would distribute the first NASA Standard Parts List (NSPL) to all NASA centers and contractors in January. The NSPL would include electronic parts selected from experience in flights, tests, failure analyses, and recent plant surveys to ensure reliability. The standardization had been undertaken to solve problems of small quantity buying, high cost, long delivery schedules, market fluctuations, part failures, and extensive rework. The NASA	A&A(1975)

DATE	EVENT	SOURCE
75/12/10	Standard Parts Lead Office at MSFC would establish requirements for parts, coordinate the effort with all NASA centers, and issue and maintain the list.	
75/12/20	The first SSME 60-second duration test was performed at NSTL.	RIC-Chron
76/01/08	MSFC issued a request for proposals from industry for the design, development, test, and evaluation of the SRB decelerator subsystem. The decelerator subsystem for each SRB consisted of a pilot parachute assembly to be deployed by the nose cap, a drogue parachute assembly to be deployed by the pilot parachute, and three main parachutes, with support structure and equipment. The plan called for twelve decelerator subsystems--two for each development flight--plus two mass simulators for ground tests and one set of support equipment. Work was expected to be done between 1 July 1976 and 31 December 1980.	MSFC-Rel-76-2
	SSME 0002 arrived at NSTL where it would undergo test firings.	SSME/RKD-QRev,04/09/76
76/01/31	SSME test 901-037 was conducted. This was the first SSME mainstage test to obtain minimum power level (65%). The engine--called the Integrated Subsystem Test Bed--was fired for 3.38 seconds. The test was conducted by RIC Rocketdyne at NSTL under MSFC direction.	SSME/RKD-QRev,04/09/76; A&A(1976)
76/02/05	A test of the subscale thrust chamber assembly was conducted to demonstrate injector cycle life (Test 188). After 118 cycles, the thrust chamber was removed for metalurgical analysis. The injector remained in the test with a new thrust chamber.	SSME/RKD-QRev,04/09/76
76/02/06	MSFC was conducting a test program aimed at finding ways to minimize noise during a Shuttle launch. Efforts were aimed at designing modifications to the existing launch facility to reduce the noise generated by vehicle engines. The noise reduction effort was important to the program because sound energy affects sensitive instruments or other payloads carried by the Space Shuttle. The research at MSFC involved the use of a 6.4% scale model of the Space Shuttle and its launch pad. Engineers constructed and operated a number of test configurations that provided water sprays into, above and below the rocket exhaust. They were able to reduce the noise effectively by having the engines fire into a carefully designed water spray, thereby converting acoustic waves into thermal energy, which was then dissipated as steam.	MSFC-Rel-76-33
76/02/25	Fred W. Haise, Jr., astronaut on the Apollo 13 lunar mission of April 1970 that nearly ended in disaster, would command the first free-flight Shuttle test, JSC officials announced. The Shuttle was scheduled to fly piggyback in 1977 on a modified Boeing 747 jet transport. The Shuttle would then be released at an altitude of about 8 km for free-flight testing and landing. Haise and Air Force Lt. Col. Charles G. Fullerton would guide the Shuttle to an unpowered landing at the Dryden Flight Research Center to demonstrate handling and reusability.	A&A(1976)
76/03/10	SSME test 901-043 was conducted. The firing lasted for 20 seconds at minimum power level (65%). The test throttled up to 55% rated power level (RPL).	SSME/RKD-QRev,04/09/76
76/03/12	SSME test 901-044 was conducted. The firing lasted 42 seconds at minimum power level (65%). The test throttled up to 55% RPL then to 65% RPL and returned to 55% RPL.	SSME/RKD-QRev,04/09/76

DATE	EVENT	SOURCE
76/03/24	Travelers aboard the Shuttle in the 1980s would use a unique space suit and rescue system developed at JSC. The Shuttle suit, a departure from the customized astronaut suits, would consist of a two-piece upper and lower torso cover in small, medium, and large sizes to accommodate all astronaut candidates or crews. Only the pilot and mission specialist would be outfitted with the space suit. The commander and payload specialists would be provided with a personal rescue system nicknamed the "cosmic soccerball", consisting of a container nearly a meter in diameter constructed of three layers containing its own life-support and communications systems.	A&A(1976)
76/03/25	MSFC issued an RFP to industry for SRB assembly, checkout, launch operations, and refurbishment. The cost-plus-award-fee contract planned would provide for the assembly of the SRB major components into the SRBs. The contract would also provide for checkout, launch operations support and refurbishment efforts after retrieval from the ocean. Proposals were due 19 May. The work was to be done at MSFC and KSC between September 1976 and March 1980. The contract last through the design, development, test, and evaluation phases--including the first six flights--with options for operational flights 7 to 27. This was the last major contract expected to be awarded by MSFC in connection with the development program. Further procurement actions would be required for operational flights. Contracts were already in force for the SSME and ET.	MSFC-Rel-76-52
76/03/31	The first test firing of the second SSME--SSME 0002, the first to have a flight-type engine-mounted controller--achieved the programmed 1.5 second duration firing through a diffuser used for altitude simulation. SSME 0002, a flight configuration engine that would not be flown, was a developmental engine instrumented for test purposes. It was fired on NSTL stand A-2, which had been modified to accommodate the Shuttle for testing. NASA planned to fire each engine on the A-2 throttling test position before using it on a flight. Previous testing was done on modified stand A-1 (sea-level test position).	A&A(1976); MSFC-Rel-76-57
76/04/07	Construction was completed on a new facility to be used by MSFC in the propulsion testing program. Contractor personnel left NSTL after turning over to NASA a new liquid hydrogen barge dock and transfer facility. In 1974 Algernon Blair Construction of Atlanta began building the dock and installing piping and other equipment designed for handling the cryogenic liquid. The new facility was located near the test stand which was being converted for the MPTA. The test article would consist of an ET, an orbiter simulator, and three SSMEs. The new facility passed its "cold shock" test successfully. In this test cryogenic liquid nitrogen was run through the system to verify operation under cold temperatures.	MSFC-Rel-76-65
76/04/09	The MSFC Center Director's quarterly review was held. It was attended by Center Director Dr. William Lucas, SSME Manager J. R. Thompson, Rockwell's D. J. Sanchini, and J. Thomson. Discussed at the review were the High Pressure Fuel Turbopump, the High Pressure Oxidizer Pump, and the NSTL A-2 facility's operational status. The COCA 4 was discussed; it was back in operation, but behind schedule. Welding improvements and the constant falling behind in the schedule were also discussed.	SSME/RKD-0Rev,04/09/76
76/04/13	The House of Representatives passed HR 13172, authorizing a supplemental \$16,800,000 for NASA for the period 1 July 1976 through 30 September 1976 (the so-called "transition period" after which the new government fiscal year would begin on 1 October). The authorization, supplementing NASA's research and	A&A(1976)

DATE	EVENT	SOURCE
76/04/13	program management request, was \$3,186,000 less than the original request of \$19,986,000.	
76/04/16	MSFC announced the award of two contracts totaling \$486,388 for fabrication and installation of two test towers to be used in the ET structural load tests. One contract, awarded to the Lucey Boiler Co. of Chattanooga for \$344,660, was for pickup of government-furnished construction materials from MSFC. The contract also called for fabrication and delivery of all sections and components of the towers by July 1976. The second contract, awarded to Teledyne Brown Engineering of Huntsville for \$141,728, was for installation of the towers by 30 September.	A&A(1976)
76/04/17	The \$6.2-billion Shuttle, "America's only remaining space spectacular," might come apart at the seams because of unsafe parts, Jack Anderson and Les Whitten reported in the WASHINGTON POST. Discussion at NASA as early as April 1973 had centered on the menace of substandard screws. In July 1973, Johnson Gage--a Bloomfield, CN, firm--sent NASA a warning based on tests of individual screw and nut threads stating that the standards "provide for a loophole that allows [NASA to] accept outright junk." Computer tests revealed that millions of dollars worth of faulty threads reached RIC because of low standards. It was feared the inferior screws had gotten into Shuttle equipment.	A&A(1976)
76/05/07	A Shuttle launch abort system, for use in case of a malfunction during the first 2.5 minutes of flight, was "quietly" removed by NASA 3 years earlier although such a system had been designed into Shuttle late in 1971, according to the WASHINGTON POST. Staff writer Thomas O'Toole said that in 1973 NASA "reversed itself and dropped the launch abort system...a decision understood to have been met with dissent inside the space agency." The abort system consisted of two huge SRMs, one on each side of the orbiter tail, that could be fired to separate the spacecraft and its occupants from the booster engines and SSME fuel tanks in case of trouble; however, the abort motors weighed 43,500 kg and even after they were fired, the orbiter would fall for 2 or 3 seconds before being lifted away from the boosters.	A&A(1976)
76/05/18	MSFC and DFRC officials signed an agreement to jointly conduct a comprehensive program of tests on the parachute recovery system for the SRB. The program, to begin early in 1977, would consist of drogue-parachute tests and main-parachute tests, using single parachutes, and deployment tests of the three-parachute cluster (flight configuration) to be used in recovery of the SRBs. The Dryden center would provide the B-52 aircraft for the test drops, as well as the flight and maintenance crews, and would perform the tests over the National Parachute Test Range about an hour's flight from Edwards Air Force Base in California. MSFC engineers would evaluate the test data to determine the adequacy of the system.	A&A(1976)
76/05/24	A production prototype controller for the SSME was delivered to MSFC. The new controller was being integrated with other computer equipment and engine components in the MSFC Hardware Simulation Lab. The test set-up, when complete, would be used for simulations of SSME firings designed to check out the controller and its software, and to evaluate the performance of engine hardware. The controller was made up of two redundant digital computers with associated control circuits that control all functions of the SSME, including checkout, start and stop, throttling, propellant flows and failure detection and switching, as well as monitoring various temperatures, pressures and pump	MSFC-Rel-76-90

DATE	EVENT	SOURCE
76/05/24	speeds.	
76/05/26	The SRM project would enter the full-scale test phase in late May with the start of testing on the SRM Flexible Bearing by Thiokol's Wasatch Division. Thiokol, who designed and built the bearing, was responsible for developing and testing the SRM. The Flexible Bearing, weighing about 3175 kg (7000 lb) and almost 254 cm (100 in) in diameter, represented a major scale up in size of such components used in motor propelled vehicles in flight. During testing, the Flexible Bearing would be subjected to various stress levels and gimbal angles. The results of these tests will be evaluated in preparation for the manufacturing and testing of a complete nozzle, which was scheduled for static testing as part of the first full-scale motor in spring 1977.	MSFC-Rel-76-95
76/05/28	Martin Marietta was chosen by MSFC to produce the SRB decelerator subsystem. Pioneer Parachute Company would serve as subcontractor to Martin Marietta.	NHDB-Vol.3
	MSFC modified a contract with RIC Rocketdyne Division to provide additional funds for the firm's work on the SSME and permit a longer performance period. The new action extended the first phase of the contract, the development of the SSME, by 7 months (from 29 February 1976 to 30 September 1976) and added \$110,058,750 to the contract value. The total cost and base fee of the first phase became \$358,768,349 as a result of this modification.	MSFC-Rel-76-97
76/06/03	MSFC issued a \$940,000 contract for electronics items to be used in the SRBs. The firm-fixed-price contract for the Wide Band and Strain Gauge Signal Conditioners (WBSC and SGSC) for SRB development flight instrumentation went to K West of Westminster, CA. Under terms of the contract, K West would fabricate, acceptance test, and deliver some 498 items during calendar years 1976 through 1977 with deliveries every two months. The WBSC and SGSC would be housed inside the forward skirt area of each SRB. A signal conditioner takes an electrical signal from a sensor and changes it to the proper form--AC or DC--and raises or lowers the power level as required to perform the intended function.	MSFC-Rel-76-99
76/06/04	MSFC issued a \$1,443,500 contract for electronic items to be used on the SRBs. The firm-fixed-price contract for the Frequency Division Multiplexer (FDM) for SRB development flight instrumentation went to Aydin Vector Division, Newton, PA. Under the terms of the contract, Aydin Vector would fabricate, fabricate, acceptance test, and deliver some 55 items during calendar years 1976 through 1977 with deliveries each month. The FDM would be housed inside the forward skirt area of each SRB. An FDM receives electrical signals from a sensor and inputs the signals to tape recorders on the SRB and in the orbiter.	MSFC-Rel-76-102
76/07/00	MSFC Shuttle activities during July included testing, procurement, and construction work. This included: award of 14 contracts to industry; completion of a 2.8% scale SRB model to be tested in Ames Research Center wind tunnels; completion of the first phase of acoustic testing using Shuttle models and a KSC launch pad; award of a \$247,363 contract to RIC Space Division to study SRB and ET options to reduce cost and increase payload weight capacity; completion of tests with KSC to ascertain the effects of the ocean water on Shuttle elements; RFPs for development of range safety receivers; preparations for the arrival of the first orbiter for testing.	A&A(1976)
76/07/08	NASA issued a call for astronaut candidate applications. Fifteen pilots and	A&A(1976)

DATE	EVENT	SOURCE
76/07/08	15 mission specialists would be selected by December 1977. Applications would be accepted through June 1977. Candidates would report to JSC in July 1978 for 2 years of training. Appointment as an astronaut would depend on satisfactory completion of training. Minority and women candidates were encouraged to apply. Pilot astronauts would control the Shuttle during launch, orbit, and landing, and would maintain vehicle systems. Mission specialist astronauts would coordinate orbiter operations in flight planning, use of consumables, and management of the payload.	
76/07/15	MSFC awarded a \$247,363 study contract to the RIC Space Division. The study would identify SRB and ET options which potentially could further reduce Shuttle cost per flight and increase payload weight capacity. The study was a 12-month effort which was expected to provide a data base for understanding possible future modifications to the operational system. The modifications would improve space transportation economy and could be available after the first years of operation. The study would include cost and schedule data and provide a basis for later assessment of overall system impact of these options on the program. The contractor would indentify and define tank and booster configurations along with evaluation and selection criteria for screening those configurations. The most attractive would be recommended for futher study.	MSFC-Rel-76-118
76/07/16	The first flight configuration nozzle for the SSME was completed and proof tested successfully at Canoga Park, CA. The first 77:1 area ratio nozzle completion represented a significant design and manufacturing achievement. It consisted of 1,080 precisely formed tapered tubes brazed to a shell and stiffened by bands. The nozzle was 3 m (10 ft) tall and 2.7 m (8 ft) in diameter at the exhaust exit. It weighed 454 kg (1000 lb). The first nozzle began a detailed test series to verify design and manufacturing techniques. These tests would be performed primarily at RIC's Santa Susana, CA, Test Area and at NSTL.	MSFC-Rel-76-128
76/07/21	Assembly of the first ET began at the Michoud Assembly Facility (MAF), New Orleans, LA. ETs were to be manufactured by MMC, the ET prime contractor. The ET, which would carry the propellants for the SSMEs, consisted basically of two tanks, one for fuel and the other for oxidizer, and an intertank section which fastened the two together. Assembly of the first ET started with the welding of gore segments to form subassemblies for the fuel tank dome. This completed, the subassemblies were being prepared for welding together to form a dome assembly. It was expected that assembly of this tank would be completed and the tank delivered to NSTL in mid-1977 for use in the Main Propulsion Test (MPT) Program.	MSFC-Rel-76-137
	MSFC announced the award to Martin Marietta, Denver Division, of a cost-plus-incentive-fee/award-fee contract for \$9,282,667 to deliver parachute decelerator subsystems for recovery of SRBs from six flights. The contract, effective through December 1980, covered design, development, manufacture, and refurbishment of the subsystems. Work was authorized to start 6 July at Martin's plant in Colorado and at Pioneer Parachute Co. of Manchester, CN, subcontractor.	A&A(1976)
76/07/29	MSFC announced that engineers recently completed testing minitank no. 5, an aluminum tank used to test thermal protection systems for the liquid hydrogen portion of the ET. This tank was the fifth in a series of 13 such tanks which had been or would be tested at MSFC. The minitanks were insulated at MAF by MMC and then shipped to MSFC. The purpose of the minitank testing program was to	MSFC-Rel-76-142

DATE	EVENT	SOURCE
76/07/29	investigate the ability of MMC's foam insulation to withstand the various types of stress created during launch and space flight.	
	The first facility constructed exclusively for the ET project was completed at NASA's Michoud Assembly Facility (MAF) in New Orleans. Most other facilities in the ET project were existing structures that had been modified for use in the Space Shuttle program. The Pneumatic Test Facility would be used to perform both proof tests and leak tests of the ET's liquid hydrogen tank to certify tank structural integrity and to verify that no out-of-specification leaks existed.	MSFC-Rel-76-143
76/07/30	A developmental engine (SSME 0003) was test fired for 650 seconds, the longest test firing to date. No problems were indicated in the test data.	MSFC-Rel-76-174
76/08/09	The space share of the federal R&D funding for FY77 would increase only slightly, according to a National Science Foundation report, "An Analysis of Federal R&D Funding by Function, Fiscal Years 1969-1977". The 1977 estimate of \$2.94 billion was considerably less than the 1969 level of \$3.73 billion. The space share--13%--was much lower than the 24% for the earlier year. Manned space flight, always the leading subfunction, remained predominant with Shuttle accounting for more than 40% of all space activities. Space technology and NASA support activities would increase during FY77.	A&A(1976)
76/08/13	MSFC announced the completion of two of eight major facilities for production of SRMs at Thiokol, Wasatch Division. Thiokol was selected as prime contractor by MSFC for development of the SRM. The two completed units were a nozzle-bearing test facility and an x-ray facility for inspecting propellant after casting into the motor-case segments. A case preparation building, where motor cases would be prepared for propellant loading by sandblasting, cleaning, relining, and painting, was reported 95% complete. Three facilities for loading the propellants were about half completed. A case refurbishment facility to handle the motor cases after recovery would be under construction shortly.	MSFC-Rel-76-151
76/08/20	Complete horizontal ground vibration tests and proof load tests on Orbiter 101 were performed.	RIC-Chron
76/08/31	NASA selected three firms for negotiations leading to the award of a single contract for assembly, checkout, launch operations, and refurbishment of the SRB, MSFC announced. The firms were Boeing, McDonnell Douglas, and USBI of Sunnyvale, CA, a wholly owned subsidiary of UTC. The contract would extend through March 1980 to include the first six development flights, with option for renewal through February 1982. The contractor would be responsible for assembling and checking out the booster with the SRM. Work on this contract was to be performed at MSFC and KSC.	MSFC-Rel-76-159
76/09/02	MSFC announced that the Space Division at Palmdale, CA, had received three dummy main engines for mounting on Orbiter 101, which would be used for approach and landing tests at DFRC and for ground vibration tests at MSFC. The simulator engines, resembling the real SSMEs in size and weight, could be adjusted in weight and center-of-gravity and gimbaled to provide various positions for testing. After vibration testing, Orbiter 101 would be returned to Palmdale for replacement of the simulators with flight engines and placed in flight status.	MSFC-Rel-76-162
76/09/03	MSFC announced the start of hot-firing tests of the steering system for the SRB. The first series of tests, which would continue into October, would confirm	MSFC-Rel-76-163

DATE	EVENT	SOURCE
76/09/03	design of the thrust vector control steering system developed by MSFC engineers as part of the center's responsibility for SRB design and development. The system under test would provide power to move the nozzle of the SRB in any direction, steering the Shuttle in the first 120 seconds of SRB burn. Data from the first series of tests would be evaluated to refine the system design. After any needed modifications, a second series of tests would certify the system. Thrust vector control units would be provided in 1978 to Thiokol for testing under actual firing conditions.	
76/09/08	President Ford named Orbiter 101 the Enterprise, over the objections of NASA officials who preferred the name Constitution and had planned rollout ceremonies for Constitution Day, 17 September. NASA Administrator Dr. James C. Fletcher had paid a 45-minute visit to the White House to brief the President on the program and to discuss the naming. The name Constitution had met with objections that Shuttle was considered an international effort in which several countries would participate. The name Enterprise had been given to the first nuclear-powered carrier, to a WWII carrier, and to an American ship in the Revolutionary War, not to mention to the space ship in the TV series Star Trek. Nearly 100,000 fans of Star Trek signed petitions asking the White House to name the first orbiter Enterprise.	A&A(1976)
76/09/17	The Enterprise rolled out of RIC's assembly facility at Palmdale, CA, just before 1:00 p.m. EDT, to the strains of the theme from the television show "Star Trek".	A&A(1976)
76/09/19	A NASA study reported that relocation of crew training and mission control activities from JSC to Cape Canaveral would offer "no management, technical or budgetary advantages" and "would seriously affect a smoothly functioning, highly efficient organization" at JSC, delaying the program by up to 2 years. The study was requested in June 1975 by Rep. Don Fuqua (D-FL), chairman of a subcommittee on space science and applications of the House Committee on Science and Technology. The study said that relocation would cost up to \$842 million in unrecoverable funds by 1983.	A&A(1976)
76/09/22	DOD did not really want the Shuttle, charged Sen. William Proxmire (D-WI), and NASA had "conned Congress into buying a pig in the poke" in its efforts to obtain funds for development. DOD had shown that it did not want the Shuttle by its actions, said Proxmire, citing DOD's statement that it would "under no circumstances" pay for the 4th and 5th orbiters. The DOD decision to go forward with a new satellite communications system (DSCS-III) "which will not capitalize on the unique advantages of the Shuttle...[but] is to be compatible with...the present Titan III-C" as well. Proxmire charged that the DSCS decision was based, not on a 9-month wait for Shuttle, but on the fact that "DOD has little confidence in a cost-effective...Shuttle." Proxmire also cited a GAO report issued in April that DOD would pay less to launch its reusable satellites on expendable vehicles than on the Space Shuttle through 1990-91.	A&A(1976)
76/09/27	MSFC delivered the first SRB production case segment to Thiokol's Wasatch Division in Utah, beating the schedule by 3 days. All case segments for the first SRB were scheduled to arrive at Thiokol by the end of 1976. The delivered segment, almost 4 m in diameter and 4.2 m long, weighed almost 6000 kg. Eleven segments would be used in each motor. Joined, the segments and nozzle would measure more than 38 m long, over three fourths of the total SRB length.	MSFC-Rel-76-173

DATE	EVENT	SOURCE
76/09/30	MSFC announced that personnel of RIC Rocketdyne Division had fired a developmental test engine for 650 seconds, the longest test to date. The same engine had been fired for 300 seconds 2 days earlier. The tests, conducted at NSTL, would produce component and system operation data from extended-duration firings at increasing power levels.	MSFC-Rel-76-174
76/10/07	Modifications of the test stand to be used at NSTL for static firing of the combined propulsion system had been finished 2 weeks early, MSFC announced. The stand had been built for tests of the Saturn V first stage and converted for use in the Shuttle program by Industrial Contractors of Idaho Falls, Idaho. In the tests, scheduled to be conducted late in 1977 by workers in RIC Space Division under MSFC direction, the SSMEs would be connected to a structure resembling the orbiter. The simulator, using both flight and nonflight hardware, would be attached to an ET. Firing of the MPTA would be the first time the three SSMEs were fired as a system. Engineers would combine acoustic tests with the MPTA firings to obtain data for determining optimum vibration and sound levels. They would also use the data to check tanking procedures. Hardware for the tests would arrive at NSTL the next summer.	MSFC-Rel-76-178
	MSFC issued a \$531,268 contract to Teledyne Lewisburg (TN) for production of electronic hardware items for the Space Shuttle. The contract called for design, development, testing, fabrication, assembly, qualification testing, and delivery of location aid transmitters for the SRBs. The transmitters would help recovery personnel on ships locate the SRBs. The SRBs would be towed back to shore for disassembly, refurbishment, refueling, and repeated reuse. The 42-month contract called for delivery of 38 transmitters, 30 of which would be flight units. The others would be used in development and testing activities.	MSFC-Rel-76-179
76/10/22	MSFC announced the completion of a huge self-propelled vehicle called the Straddle Carrier Transporter. It was fabricated by MDAC at St. Louis, MO, and shipped to MSFC for assembly, to be used in moving sections of the ET at MAF in New Orleans. Assembled, the ET would measure 47.2 m in length and 8.5 m in diameter; empty, it would weigh 33,300 kg and would carry about 708,440 kg of propellants for launch. The transporter, completely self-supporting, would use electricity from a propane-powered generator for its hydraulic propulsion system, steering, lights, and hoists. It would lift, stabilize, and carry major ET assemblies over concrete floors and improved roadways.	A&A(1976)
76/10/24	RIC inspectors tested their inventory of transistors after a government warning to watch for counterfeit semiconductors. They found 11 of 11 transistors of one type to be fakes. Rockwell concluded that the bogus parts had been "unwittingly built into [NASA's] major current project...for which Rockwell is the prime contractor." The presence of bogus devices had plagued the electronics industry for the last year and a half.	A&A(1976)
76/10/29	MSFC announced that modification of its Saturn facilities to accommodate the Shuttle had been completed with the remodeling of the Saturn V test stand used in the 1960s. The stand would be used in structural test of the liquid hydrogen tank portion of the ET. The test stand modifications included new work platforms, changes in the stand structure including pressurization, and a new instrumentation and control system. Holddown arms were removed and the flame deflector that channeled rocket exhaust away from the area was taken from under the stand. Liquid oxygen storage facilities used for Saturn were converted for storage of liquid hydrogen needed for Shuttle testing, instead of building new	MSFC-Rel-76-195

DATE	EVENT	SOURCE
76/10/29	storage. The contract with Algernon Blair of Montgomery, AL, by the Huntsville Division Corps of Engineers, was for approximately \$4 million.	
	MSFC announced the selection of Bendix, Teterboro, NJ, for negotiations leading to the award of a \$7,007,210 cost-plus-award-fee contract for installation, activation, disassembly, and removal of special structural and dynamic ground test equipment at MSFC. The contract would run from 15 November 1976 through December 1979.	MSFC-Rel-76-196
76/12/17	NASA announced the selection of USBI, Sunnyvale, CA, as SRB assembly contractor. USBI, a subsidiary of UTC, received a cost-plus-award-fee contract for \$122 million to cover six design, development, and test and evaluation up to March 1980. The contract also included options for 21 operational flights extending into 1982. The contract would cover all SRB assembly activities at MSFC and KSC.	MSFC-Rel-76-215
77/01/30	The Enterprise, towed atop a 90-wheel trailer from Rockwell's plant in Palmdale, CA, made its first trip to Edwards Air Force Base 57 km away. Escorted by a convoy of security and patrol cars, the Enterprise moved at 8 kph and drew hundreds of spectators to view its configuration. Tests of the 38-meter-long space vehicle would begin 18 February with a series of captive flights. The first manned flight to an unpowered landing was set to occur 22 July.	A&A(1977)
77/02/04	NASA announced a year-long schedule of test runs and captive flight tests on the Enterprise that would take place at the Dryden Flight Research Center, Edwards, CA. Called approach and landing tests (ALT), the series of flights, with a modified Boeing 747 serving as a ferry aircraft and airborne launch platform, would begin with several taxiing tests with the orbiter atop the carrier. Following would be six inert captive flights in which the jumbo jet would carry the unmanned orbiter to a 7620-meter (25,000 ft) altitude. Unmanned flights would verify performance of the two vehicles in mated flight. Then would come a series of captive-active flights with the orbiter's systems powered up and the Enterprise manned by two astronauts.	A&A(1977)
77/02/07	MSFC announced that a special hammer developed in the 1960s for Saturn fabrication had solved a major problem of manufacturing ETs. MMC had found, in welding four large sections of the liquid oxygen tank at MAF, that peaking of the weld joints left some areas as much as 5 degrees out of tolerance. An electrical charge dumped into the hammer's coil would create an expanding magnetic field when the tool touched the metal. The field would then exert an evenly distributed three-dimensional force that would remove the distortions without leaving hammer marks on the target. MMC was able to remove most of the distortions during the week of demonstration. Two working hammers would remain at the plant for future use.	A&A(1977)
77/02/15	An Orbiter 101/carrier aircraft mated ground vibration test was completed. In addition, three taxi tests were conducted.	RIC-Chron
77/02/17	NASA amended an existing contract to provide for additional ET manufacturing facilities at MAF. The amendment added \$3,717,690 to the basic facilities contract held by MMC, Michoud Operations. The new contract total was \$30,263,490. MMC was building the ETs under another contract. The amendment authorized the construction of one new facility, the addition of cell D to the Vertical Assembly Building (VAB), and provided for the continuation of facility	MSFC-Rel-77-28

DATE	EVENT	SOURCE
77/02/17	work previously authorized.	
77/02/18	The unmanned orbiter Enterprise took its first ride over the California desert. It was carried piggyback on its converted Boeing 747 for a 2-hour test at nearly 5 km altitude. Operating the 747 were veteran NASA test pilot Fitzhugh L. Fulton, Jr., copilot Thomas C. McMurtry, and flight engineers Victor W. Horton and Lewis E. Guidry, Jr. The Enterprise was secured to the 747 by mounts at its nose and tail. The combination craft stood almost 20 m from the ground to the top of the orbiter's tail. The explosive bolts provided to separate the two craft in free flight were armed during this first test, in case of emergency.	A&A(1977)
77/02/22	The second inert captive flight of the Orbiter 101, the Enterprise, was conducted. The flight lasted 3 hours and 13 minutes and was conducted at DFRC.	RIC-Chron
77/02/25	MSFC reported that MAF had shipped the first of four major pieces of test hardware for the ET to MSFC. The intertank structural test article was scheduled to arrive by barge about 5 March. It would go from New Orleans to Huntsville by way of the Mississippi, Ohio, and Tennessee Rivers, the route NASA had used to ship Saturn stages for testing during the Apollo program. The other test articles (a liquid hydrogen tank, a liquid oxygen tank, and another intertank) would arrive later in 1977.	MSFC-Rel-77-30
	The third inert captive flight of the Orbiter 101, the Enterprise, was conducted. The flight lasted 2 hours and 28 minutes. It was conducted at DFRC.	RIC-Chron
77/02/28	JSC announced it had awarded a contract worth \$2 million to Hamilton Standard Division, United Technologies, Windsor Locks, CT, to supply space suit systems for Shuttle crews. The system, an extravehicular mobility unit (EMU), would consist of a suit with integrated life-support backpack for use outside the orbiter's pressurized cabin. The suit would come in small, medium, and large upper and lower torso standardized sections to replace the individualized suits of earlier manned programs. The contract called for equipment and spares for seven suits and supporting hardware, plus training, manpower, and field support at JSC and other NASA centers. The overall cost of the system was estimated at about \$18.5 million.	A&A(1977)
	The fourth inert captive of the Orbiter 101, the Enterprise, was conducted. The flight lasted 2 hours and 11 minutes. It was conducted at DFRC.	RIC-Chron
77/03/02	The fifth inert captive flight of Orbiter 101, the Enterprise, was conducted. The flight took place at DFRC and lasted 1 hour and 39 minutes.	RIC-Chron
77/03/07	MSFC announced that it would consider using the ET as a permanent space platform. James E. Kingsbury, head of MSFC's S&E Directorate, proposed to replace 57 cubic meters of an ET's liquid oxygen with provisions for 90 days. Then another Shuttle would be launched bringing a crew, a Skylab airlock module and multiple docking adapter, and a solar electric conversion wing to the orbiting ET to constitute a habitable space station. All the required equipment had been flight tested.	MSFC-Rel-77-36
77/03/08	MSFC announced a \$1,046,100 amendment of the SSME contract with Rocketdyne Division of RIC, Canoga Park, CA. The amended contract, totaling more than \$66 million, would include equipment to build the SSME.	MSFC-Rel-77-37

DATE	EVENT	SOURCE
77/03/09	MSFC reported plans to request another \$18,610,000 in NASA's FY78 budget for construction or modification of facilities to be used in building the ET at MAF near New Orleans. With the addition of a chemical waste treatment plant and alterations of the manufacturing, vertical assembly, final assembly, and checkout buildings, MAF could produce 28 ETs each year.	MSFC-Rel-77-35
77/03/11	MSFC reported that parachutes to recover the SRB were undergoing dynamic testing at MMC, Denver, CO. Scheduled for completion 31 March, the tests simulated inflight parachute deployment from the SRB.	MSFC-Rel-77-44
77/03/16	MSFC announced the award of a \$279,714 contract to Sperry Support Services, a division of Sperry Rand, Huntsville, AL, for design, construction, and delivery of equipment for the mated vertical ground vibration test (MVGVT) series scheduled for 1978. The tests would confirm the theoretical model used in dynamic analyses of the Space Shuttle, ET, and SRBs.	MSFC-Rel-77-39
77/03/17	The huge Saturn S-IC test stand at NSTL, modified to test the Main Propulsion System, was turned over to the test contractor, Rockwell International, Space Division.	NASA-Rel-77-55
77/03/18	NASA announced that the SSME had been successfully tested at rated thrust conditions for 60 seconds with a total test duration of slightly over 80 seconds. The firing had been conducted the previous weekend by personnel of the Rocketdyne Division of Rockwell International. It was conducted at NSTL and was achieved on SSME 0003 in the A-1 sea level test position.	NASA-Rel-77-54
77/04/05	MSFC announced the award of a \$918,523 contract to T.H. Taylor Construction Co., Montgomery, AL, for the construction of permanent and semipermanent steel working platforms on the modified dynamic test stand. The stand would hold an entire Space Shuttle assembly during MVGVT scheduled for 1978.	MSFC-Rel-77-54
77/04/06	MSFC announced it had awarded a \$276,597 contract to Bryson Construction, Decatur, AL, for modification of the Redstone Arsenal airfield to accept the Shuttle and its Boeing 747 carrier aircraft. The contractor would install a concrete pad 75 m long and 55 m wide for a derrick to unload the Orbiter from the 747.	MSFC-Rel-77-56
77/04/07	The liquid oxygen tank of the ET had undergone successful hydrostatic tests at MAF near New Orleans, MSFC reported. MMC Aerospace, prime ET contractor, had scheduled additional tests to simulate flight pressure.	MSFC-Rel-77-58
77/04/14	KSC announced award of a \$95,025,000 contract to the Space Division of Rockwell International, Downey, CA, for activation of the Space Shuttle facilities and systems, and for orbiter support during checkout, launch, and postflight operations in the first six missions. Rockwell would also support postflight operations at the DFRC landing site for the first four missions.	A&A(1977)
77/04/22	MSFC received the first two integrated electronic assemblies for the SRBs from Bendix, Teterboro, NJ. Each SRB would contain two electronic assemblies to control communications and internal power distribution.	A&A(1977)
77/05/01	After an announcement 14 March, Dr. James C. Fletcher officially resigned as Administrator of NASA.	NASA-Rel-77-48

DATE	EVENT	SOURCE
77/05/04	MSFC announced that it had awarded RIC Rocketdyne Division a contract modification for additional work and services to the SSME program, covering long leadtime hardware and material procurement to provide follow-on engines. Each engine, designed for use up to 50 times before overhaul, would be capable of 1,668,075 newtons (375K lb) of thrust at sea level and 2,090,654 newtons (470K lb) at altitude.	MSFC-Rel-77-78
77/05/06	MSFC announced it had awarded MMC Denver Division a \$928,217 contract for construction work on a test stand for the Shuttle. Modification of the giant hydrodynamic support system, last used for Saturn V dynamic tests in the 1960s, would allow the mating of all the Shuttle elements for vertical ground tests scheduled to begin in 1978. The complete vehicle (orbiter, ET, and SRBs) would occupy the stand together for the first time.	A&A(1977)
77/05/10	MSFC announced the completion of pressure and structural load tests on the ET's liquid hydrogen tank. The tests, to certify that the tank met design and manufacturing standards, included filling the tank with nitrogen at 42 psi for 14 hours and applying hydraulic loads as high as 600 tons at the SRB attach points. The ET's hydrogen container--about 30 m (97 ft) long and 8.3 m (27.6 ft) in diameter--would then go for cleaning, corrosion protection, and insulating.	MSFC-Rel-77-83
77/05/16	AVIATION WEEK reported that NASA had chosen the "key missions" for the six Shuttle orbital flight tests and had assigned payloads as well as the weight and volume available for additional experiments. Chester M. Lee, Director of STS operations, would give Associate Administrator John E. Naugle a list to begin assigning experiments on the basis of the key payloads. The first mission (tentatively scheduled for March 1979) would carry only a developmental flight-instrumentation unit that would also ride on other flight tests. The second mission (scheduled for July 1979) payload would be an instrumented pallet for scientific research amounting to only a small weight in the payload bay but would offer the NASA program office a first research opportunity on the Shuttle. NASA noted that unforeseen circumstances could change the key payload schedule for the first orbital flight tests.	A&A(1977)
77/05/24	MSFC announced it had completed modifications of the test stand used in the 1960s for static test firing of the Saturn I and IB. The stand was modified to accommodate structural testing of the SRB. The tests would use a short-stack SRB to simulate prelaunch, flight, and recovery reactions.	MSFC-Rel-77-95
77/06/01	DFRC announced it would drop-test the parachutes from the SRB recovery system at the National Parachute Test Range, El Centro, CA. The tests would include a series of air drops to evaluate design, deployment, performance, and structural integrity of full-scale parachutes. The parachutes were attached to two configurations of drop-test vehicles offering various limit and overload conditions for the drogue and main parachutes at reefed and full open-canopy shapes. Engineers from MSFC, which had responsibility for developing the SRBs, and from Martin Marietta, developer of the parachute system, would use the results to evaluate the adequacy of the system.	A&A(1977)
77/06/03	DFRC announced that a malfunction during a 2 June test of the orbiter's auxiliary power system would delay the orbiter's first manned captive flight for 1 or 2 weeks, depending on successful completion of ground tests. The flight was originally scheduled for 9 June.	A&A(1977)

DATE	EVENT	SOURCE
77/06/10	NASA announced that the first manned test flights of the orbiter Enterprise would begin at DFRC about 16 June. In these captive flights (Phase 2 of approach and landing tests), all orbiter systems would be ON to verify crew procedures and determine the best separation profile for upcoming manned free flights. In the initial phase that ended 2 March, the orbiter, fastened to its Boeing 747 carrier made five captive inert (unmanned) flights at DFRC to check out its systems. In Phase 2, the orbiter would make four flights still attached to the 747 but with crew aboard to check flutter, steering, and other performance items.	A&A(1977)
77/06/15	MSFC successfully tested the SRB recovery system at the National Parachute Test Range in El Centro, CA. Engineers used an SRB simulator, a drop-test vehicle weighing more than 21,773 kg (48,000 lb), released from beneath the wing of a B-52 aircraft at a speed of about 85 meters per second (190 mph) and an altitude of about 5500 m (18,000 ft). The primary purpose of this test was to measure the maximum load on the drogue chute that would open first to stabilize the vehicle and pull out the other chutes. The measured load, about 114,000 kg, was about that expected. The next test, scheduled for late July or early August, would measure loads on the other parachutes.	MSFC-Rel-77-115
77/06/16	Dr. Wernher von Braun, 65, former Director of MSFC, died on this day. Dr. von Braun had headed the team which used a JUPITER-C rocket, developed by him for the Army, to launch EXPLORER-1, the western world's first earth satellite, on 31 January 1958. His name became synonymous with "America in space." When NASA was established in 1958, von Braun and his team transferred over from the Army's ABMA. In 1970 Dr. von Braun transferred to NASA Headquarters to become Deputy Associate Administrator. His primary task was to promote post-Apollo space activities for the U.S. In 1972, after a sharp decline in public support, von Braun resigned to become vice president for engineering and development at Fairchild Industries, Inc. In 1975, he founded and became first president of the National Space Institute. In 1976, illness overtook him. He resigned from Fairchild late that year.	A&A(1977)
77/06/17	MSFC announced it had awarded to Contractors Cargo, South Gate, CA, a \$227,120 fixed-price contract for moving the orbiter Enterprise eight separate times during testing at MSFC in 1978. The Enterprise would fly on its Boeing 747 carrier to MSFC on 17 March 1978, to be mated with an ET and two SRBs. The article would be mounted on a dynamic test stand for vertical ground vibration testing. The contract called for design, testing, and delivery to MSFC of an orbiter ground transporter to travel about 6 km between the airfield and the pretest preparation building--a trip to be completed within 2 hours on 18 March 1978.	A&A(1977)
	NASA announced that preparations at KSC for launching the Shuttle required only two new major constructions: an orbiter landing facility with a microwave scanning beam landing system to assist the orbiter to an automatic landing; and a large hangar, called the "orbiter processing facility", with two high bays for check out and servicing of the orbiters after landing. Existing facilities modified for the Shuttle were the Vehicle Assembly Building (VAB) and the launch control center. These facilities were modified because they were equipped with an automated launch processing system developed for checkout and launch. Much of the work was completed. NASA reported that the eventual cost of the modifications would be about \$240 million.	A&A(1977)

DATE	EVENT	SOURCE
77/06/18	The first manned flight of the Enterprise was conducted. The orbiter rode piggyback on its Boeing 747 transport during the 54-minute trip over DFRC. Flying under the control of JSC in Houston, astronauts Fred W. Haise and USAF Lt. Col. Charles Gordon Fullerton rode the craft to 15,000 ft at 209 mph for most of the flight. The test had been delayed for 24 hours by problems with the entry hatch and by the failure of guidance system computers. The astronauts reported trouble with a cabin pressure valve and radio communications. They also said they experienced more airframe surface noise than expected. NASA had scheduled a second manned inert test for 28 June, with the first free flight set for late July or early August.	A&A(1977)
77/06/20	JSC announced it had signed a \$40 million letter contract with Rockwell International, Space Division, for modifications to the first orbiter, Enterprise, and for starting design of a third orbiter. Funded in part by the Economic Stimulus Bill, the contract was directed at generating more employment opportunities.	A&A(1977)
77/06/24	A huge steel structure to simulate the Orbiter arrived at NSTL. The simulator would be used in MPTA firings later in 1977. The article would include the simulator with an aft fuselage, an ET, and three SSMEs. The first test would take place in December. The simulator, about 29 m long and weighing 110,000 kg, had moved from the Michoud Assembly Facility near New Orleans to NSTL on the barge Pearl River, having traveled from California to Michoud via the Panama Canal on the NASA barge Poseidon.	MSFC-Rel-77-118
77/06/28	NASA conducted the second manned inert flight of the Shuttle orbiter Enterprise atop its Boeing 747 carrier. The flight, with Joe Engle and Richard Truly at the controls, was so successful that the agency canceled a fourth test and decided to limit the captive flights to three. The third flight would be put off until 28 July to allow replacement of main landing gear actuators, replacement of a leaky power unit, and installation of 100 gal hydraulic reservoir tanks. The orbiter would remain mated to the 747 during the work.	A&A(1977)
77/07/15	NASA announced that more than 8000 persons had applied for the 30 to 40 openings as astronauts after a year-long recruiting effort. Candidates selected would report in 1978 for a 2-year training period at JSC. Of the 8037 applicants, 6735 were for mission specialist and 1302 were for pilot; 1142 of the applicants were women. NASA would announce selections in December 1977.	A&A(1977)
77/07/18	Dr. Robert A. Frosch, NASA Administrator, and Professor S. Dhawan, Secretary, Department of Space and Chairman, Space Commission, Government of India, signed a Memorandum of Understanding for the launch of Indian National Satellite System-1 (INSAT-1). This was the first Memorandum of Understanding signed by NASA with a foreign governmental agency for provision of STS launch services on a reimbursable basis.	NASA-Rel-78-109
	MSFC announced that NASA issued an RFP on payload missions integration for the sixth Orbital Flight Test (OFT). The purpose of integration activities was to develop a complement of experiments into a compatible payload. The activities would include analysis and configuration control, instrument development, test and checkout, flight operations, and disassembly of the payload after the mission. MSFC was named manager for the OFT.	MSFC-Rel-77-131
	MSFC reported that it had conducted a 2-minute firing of the largest SRM	MSFC-Rel-77-125

DATE	EVENT	SOURCE
77/07/18	ever developed, at Thiokol's installation 24 miles from Brigham City, UT. The Thiokol motor, the propulsive part of the SRB, contained 502,454 kg (more than 1.1 million lb) of propellant. A composite fuel, mixed and poured into the four segments of the SRM, cured for 4 days before the segments were joined horizontally at the test site by special handling devices. The segments were to go by rail to KSC for vertical assembly. Each Shuttle launch was to use two of the boosters, designed for reuse up to 20 times.	
77/07/20	NASA announced it would conduct the third manned inert flight of the Enterprise on or about 26 July at Dryden Flight Research Center. At the controls of the orbiter atop its Boeing 747 carrier would be astronauts Fred W. Haise and C. Gordon Fullerton, making their second piggyback run in this test series. They had made the first captive flight 18 June; the second, on 28 June, had Joe Engle and Richard Truly as pilots. For the third test, the 747 would carry the orbiter to an altitude of 7895 m (25,905 ft) where it would "push over" in a practice separation. The orbiter and 747 crews would go through all the motions except actual separation. The flight would be a dress rehearsal for the first free flight of the orbiter, scheduled on or about 12 August.	A&A(1977)
77/07/26	The third manned captive flight of Orbiter 101, the Enterprise, was conducted. The flight took place at DFRC and lasted 59 minutes and 50 seconds.	RIC-Chron
77/07/29	NASA announced that the first 20 of about 200 astronaut applicants would report to JSC on 2 August for a week of individual interviews and physical exams. Ten of the group were from the USAF, seven from the Navy, two from the Marines, and one civilian. Although all the initial group were pilot applicants, NASA expected the number interviewed at JSC would divide evenly between pilot and mission specialist applicants. NASA would complete their processing by mid-November and hoped to select as many as 20 astronaut candidates in each of the two categories in December. Candidates would report to JSC in 1978 for 2 years of training and evaluation; final selection as astronaut would depend on satisfactory completion of training.	A&A(1977)
77/08/01	NASA announced that it had identified about 40 payloads to be carried on 11 Shuttle flights in the craft's first year of operation, beginning in 1980. Three civilian firms had deposited "earnest money" with NASA for payloads on eight flights. NASA had plans for five payloads, and DOD had plans for one. Chester M. Lee, STS Operations Director, said that NASA had also forecasted 12 non-NASA civilian payloads, 10 NASA payloads, and four DOD payloads for launch during 1980 and 1981. Allocating the payloads to specific flights would not be firm until about 1 year before launch. A working model for Space Shuttle traffic in the first 12 years totaled about 560 flights. The model also showed NASA flying about half the missions on its own; 20% would be DOD missions; 6% would be other U.S. government agency missions; 12% would be commercial firms; and 12% would be foreign customers.	A&A(1977)
77/08/12	The orbiter Enterprise made its first free flight at Edwards Air Force Base with a flawless landing 53 minutes 51 seconds after take off and 5 minutes 22 seconds after release from its 747 carrier. Astronauts Fred W. Haise, Jr., and Charles Gordon Fullerton were the Enterprise pilots; veteran test pilots Thomas C. McMurty and Fitzhugh L. Fulton, Jr., flew the Boeing 747. The Enterprise landed like a glider, without engines, relying on a battery of computers and advanced control systems. It approached the ground at an 11 degree angle and at a	A&A(1977)

DATE	EVENT	SOURCE
77/08/12	speed of 210 mph. The purpose of the free flight exercises was to verify the orbiter's subsonic airworthiness, the operation of the integrated system, and the pilot-guided versus automatic approach and landing capabilities.	
77/08/17	MSFC announced it had begun the first of a series of tests on the external propellant tank to verify its ability to stand the structural stresses of launch. The proportions of the tank required the test to be conducted in phases. The tests would apply upward loads as great as 4.35 million lb to the intertank cylinder subjected to opposing downward forces. The loads would come from computer-actuated hydraulic jacks, 28 on the forward end of the test article and as many as 10 in the center section. Chuck Verschoore, MSFC test engineer, said the forces exerted by the jacks could simulate bending and twisting effects as well as straight up-and-down loading, and could go as high as 140% of the tank's design limits. Engineers would receive data from as many as 2800 measurement channels. Follow-on tests would check the ET segments containing the liquid oxygen and liquid hydrogen propellants.	MSFC-Rel-77-149
77/08/18	MSFC reported that a new pattern of painting SRBs for orbital flight tests in 1979 and 1980 could save the agency an estimated \$300,000. The Center's system dynamics laboratory had changed the six black stripes running the length of the giant motors to four large rectangles in a spiral pattern. The new pattern would allow engineers to measure roll and pitch rates of the boosters on reentry.	A&A(1977)
77/08/30	MSFC reported that astronaut Paul Weitz had arrived on center to check out a procedure developed for jettisoning a jammed-open outer door of the Shuttle scientific airlock. Weitz would wear a pressurized space suit for the task, to be carried out in MSFC's neutral buoyancy simulator. The 75-ft diameter tank filled with water 40 ft deep would duplicate movement of people and hardware as if weightless in space. Engineers and technicians could design instruments and procedures to handle almost any foreseeable problems before actual spaceflight. Unforeseen problems, such as solar array failure on Skylab, could be solved during a space mission. Underwater television cameras would record the astronaut's movements on control room monitors. Both video and audio communications would be recorded for later study.	A&A(1977)
77/09/09	The first ET emerged from the Michoud Assembly Facility near New Orleans. The ET would go by barge to NSTL in Mississippi for inclusion in the SSME static firings.	A&A(1977)
77/09/13	The orbiter Enterprise made its second free flight at EAFB, a 5-minute unpowered glide from about 24,000ft altitude, during which it reached a speed of more than 330 mph and performed several maneuvers to test its handling before it slowed to a landing speed of 250 mph. Separation from the Boeing 747 carrier was delayed for 3 minutes because a power failure at DFRC made mission control in Houston lose radio contact. The delay caused no problems. For about 50 minutes before separation, pilots Engle and Truly took turns at the controls and the computer to monitor the orbiter's behavior at various speeds. The pilots of the 747 were Fitzhugh L. Fulton, Jr., and Thomas McMurty. The flight had been postponed from 30 August because of a tropical storm. A third test was set for late September.	A&A(1977)
77/09/20	NASA announced that they had selected McDonnell Douglas Astronautics of Huntington Beach, CA, for award of a multimillion-dollar contract for delivery	NASA-Rel-77-196

DATE	EVENT	SOURCE
77/09/20	of a series of spinning solid upper stage (SSUS) missions for the STS. The proposed contract, amounting to approximately \$9 million, would include SSUS vehicles and all the hardware, analyses, logistics and services necessary to successfully inject the spacecraft into its proper orbit.	
77/09/24	The third free flight of the orbiter Enterprise occurred over Edwards Air Force Base. The mission successfully tested the microwave scanning beam landing system originally developed for the Navy to land planes on ships at sea. Pilots Fred W. Haise, Jr., and USAF Lt. Col. Charles Gordon Fullerton turned over control to the system for part of its steep glide down, while ground transmitters kept the craft in line with the runway during the 5-minute 34-second free flight. Installed at Edwards earlier in 1977, the system would also be installed at KSC to handle Shuttle landings there. Despite radio transmission problems between the orbiter and Houston, the launch went off on schedule. At 24,000 ft in a shallow dive at 287 mph, the orbiter separated from its Boeing 747 carrier. The craft reached a maximum speed of more than 333 mph during its landing approach.	A&A(1977)
77/10/12	The Enterprise completed its fourth free flight without its streamlined 5700-lb tailcone. Without the tailcone, drag was increased and the altitude achievable by the 747 carrier was decreased to 18,000 ft. The distance the orbiter could glide after separation was also affected. Pilots Joe Engle and Richard Truly landed the orbiter at Edwards AFB, recording a touchdown speed of 212 mph and a 5000-ft landing roll. NASA's goal had been no more than 9000-ft of landing roll, showing that the orbiter could land at any major airport in the world. The last free flight was scheduled for 26 October.	A&A(1977)
77/10/14	Two women scientists at MSFC were among the seventh group of astronaut applicants chosen for further screening. Dr. Mary Helen Johnston, 32, and Mrs. Carolyn Griner, 32, were to report to JSC on 17 October 1977 for one week of physical examinations and interviews. The two were among eight women in the seventh group and among 17 women in the 140 persons chosen thus far. All the women were applicants for mission specialist positions.	MSFC-Rel-77-190
77/10/26	NASA reported that the fifth and final free flight of the Enterprise, testing its braking on a concrete runway, had successfully landed at Edwards Air Force Base. The flight had a bumpy finale when the orbiter touched down and bounced twice before stopping. Plans for future orbiter landings would be adapted on the basis of data from the fifth test. The aim point would be modified to allow for higher lift/drag coefficients with the tailcone off and the slower bleed-off of airspeed.	A&A(1977)
77/11/05	MSFC reported its engineers had prepared electronic simulations as dress rehearsals of orbital missions set for 1978, with computers in the roles of major hardware. The simulations, carried out at JSC, would check out avionics. MSFC's engineers would deliver to JSC in January 1978 the MSFC mated-elements system (MMES) simulating items for which MSFC was responsible. JSC would provide an orbiter simulator and computer to simulate Shuttle dynamics, a system called the Shuttle Avionics Integration Laboratory (SAIL) able to simulate a flight beginning 20 minutes before launch under normal or abnormal conditions. The MMES could simulate failure of almost any MSFC element to see how the systems would react with one SSME out or if high temperatures or pressures should occur.	A&A(1977)
77/11/11	MSFC reported successful completion of structural tests on the ET's	MSFC-Rel-77-212

DATE	EVENT	SOURCE
77/11/11	intertank section which includes the attach points for the two SRBs. The section is, therefore, subject to heavy loads both on the launch pad and during booster thrust in flight. MSFC engineers would proceed with vibration tests on the forward portion of the ET, the liquid oxygen container, attached to the intertank. Structural tests would follow later in 1978.	
77/11/15	Four ferry test flights of the Orbiter Enterprise, mated to the Boeing 747 Shuttle Carrier Aircraft, began 15 November and continued through 18 November at Dryden Flight Research Center, Edwards, CA. The flights measured the performance of the mated combination with a 3-degree forward angle between them. Previous flights were flown with a 6-degree angle.	NASA-Rel-77-233
77/12/05	The first open sea tests on Shuttle retrieval equipment were begun. They were staged until 16 December from Port Everglades in strong winds and seas from 3 to 6 ft that hampered operations. The first group of tests simulated parachute recovery. The second series of tests was to verify performance of the nozzle plug in open waters. The tests were also conducted to confirm the deck layout of the support vessels and how they kept position while the plug was docking with the booster. More ocean tests would follow about 1 month before the first launch. These tests would be premission exercises to train personnel who would work on the recovery.	A&A(1977)
77/12/09	The approach and landing flight tests of Orbiter 101, the Enterprise, were completed. The tests included ferry flights.	RIC-Chron
77/12/13	The first tanking, or loading, test of the ET was successfully conducted. The purpose of the test at NSTL was to assure that the MPTA, the test facility, and associated hardware could handle and hold the cryogenic propellants used by the SSME LOX and LH2 tanks. During the test the propellants were allowed to flow through the connecting piping to the three SSMEs until they were stopped by the SSME valve. Test engineers made sure the engines had cooled down to operating temperature, several hundred degrees below zero.	MSFC-Rel-77-234; RIC-Chron
77/12/23	MSFC reported that its homemade orbiter made its practice run through the center and played stand-in during practice hoists into the 430-foot test stand where the orbiter Enterprise would be mated to the other components for the first time. Werner H. Rubel, supervisor in MSFC's product planning branch, said the idea and design for the stand-in orbiter had originated in his group, where Jerry B. Bennich and John L. Ransburgh had done the engineering work. The mockup and prototype assembly branch had performed final assembly. MSFC engineers would use the simulated orbiter to rehearse tests. After completing tests at MSFC, the simulator would go by barge to KSC to check out procedures for launch. VAFB asked to borrow the simulator for its Shuttle launch facilities.	MSFC-Rel-77-234
78/01/01	NASA reported that DOD loaned five Navy divers to support the simulated weightlessness tests in the Shuttle program. The divers, all fleet-salvage men selected for their expertise in erecting or dismantling underwater structures or equipment, were assigned to the neutral buoyancy simulator at MSFC. Working underwater in full-scale Shuttle segments, they assisted test engineers with contingency procedures, equipment operation, evaluation of space construction techniques, and other activities scheduled for Shuttle and Spacelab missions.	A&A(1978)
78/01/16	NASA announced it had selected 15 Shuttle pilot-astronaut candidates and 20 mission specialist candidates as its eighth group of astronauts. The group	A&A(1978)

DATE	EVENT	SOURCE
78/01/16	included six women, three blacks, and an American of Japanese descent. The first women and minority astronauts could be in orbit within 3 years. Selection criteria for the more than 8000 applicants had been motivation, educational background, and work experience.	
78/01/18	The second SRB fired at Morton Thiokol's Brigham City, UT, test site. The 125-ft long motor on the test fixture fired for more than 2 minutes, reaching a thrust level of 2832 lb. The test firing used 1,102,400 lb of propellants. The contractor gimbaled the motor nozzle early in the test and again later in the firing for about half the total burn time. MSFC scheduled the next test for the early summer of 1978.	MSFC-Rel-78-6
78/01/23	AVIATION WEEK reported that the third instead of the fifth mission would attempt to raise the orbit of the abandoned Skylab space station, bettering chances Skylab's continued orbit until the Shuttle could come to the rescue. NASA had scheduled the third Shuttle flight for October 1979, the fifth for February 1980.	A&A(1978)
78/01/25	MSFC announced plans for two runs by a high-speed sled in February at the Sandia sled track, Albuquerque, NM. These runs were to test the "broadside deployment phase" of the SRB's parachute recovery system. The sled tests would pilot chute to determine if the nosecap when ejected would clear deploy only the the vehicle without becoming entangled, as boosters would come in flat, not sideways like an arrow, and air would flow across the nosecone at right angles. MSFC had developed the SRB and its recovery system.	A&A(1978)
78/02/08	MSFC announced that its Boeing 747, modified for orbiter transport, arrived at Redstone Army Airfield for a dry run in preparation for its March landing with an orbiter on top. Crews from MSFC, KSC, and DFRC checked out handling gear and procedures to be used at MSFC for receiving the orbiter and offloading it from its carrier. MSFC had installed a large lifting derrick at the airfield with lateral-restraint and other devices needed to lift the Enterprise clear of the 747 and position it on a trailer-like transporter. After departure of the 747, handling crews at the airfield continued verification of the mate-demate device, using the orbiter ground transporter and a full-size orbiter simulator.	A&A(1978)
78/02/23	LaRC reported that NASA had appointed astronaut Donald Slayton to manage the orbital flight test (OFT) program at JSC. Slayton was one of the original seven Mercury astronauts and a member of the U.S. crew of the Apollo-Soyuz test project. In his new position, he would be responsible for all mission-unique activities associated with the six orbital flight tests scheduled to begin in the spring of 1979. He would represent program manager Robert Thompson across the total program to ensure timely and appropriate resolution of all OFT mission-unique issues.	A&A(1978)
78/02/24	The huge ET, which would be mated to the orbiter Enterprise for the ground vibration tests later in 1978, was scheduled to arrive at MSFC on 2 March. It would come by barge from New Orleans. This would be the longest single piece of space hardware ever received at MSFC. The ET would be accompanied by a mated liquid hydrogen tank-intertank section to be used in separate structural tests at MSFC. Unloading of barges was expected to begin on 3 March.	MSFC-Rel-78-25
78/03/01	MSFC engineers reported completion of tests simulating checkout of the SRB using flight-type hardware interfaced with the launch-processing system (LPS).	A&A(1978)

DATE	EVENT	SOURCE
78/03/01	<p>The tests verified compatibility of the SRB hardware and demonstrated use of the LPS to checkout the SRB system. Flight equipment removed from simulated SRB hardware was relocated to equipment racks to simulate a left-hand SRB configuration. The LPS was then used to checkout the left-hand SRB. United Space Boosters, Inc. (USBI), performed the checkouts and then moved the equipment to KSC for use in future SRB checkouts.</p>	
	<p>NASA announced arrival of the orbiter, ET, and SRB at MSFC for the first assembly as a complete vehicle for ground vibration tests. Using a facility originally designed for Saturn V testing, engineers would begin in early spring to evaluate the structural dynamics of the assembly and their effect on the Shuttle system. The MVBVT series would consist of "floating" the Shuttle in the tall test tower and applying vibrations with exciters powered by amplifiers similar to those found on home stereo sets. Sensors on the skin would record characteristics of the vibrations passing from one area to another. The resulting data would verify system design and mathematical models of the control system's reaction to severe vibrations expected during launch and flight into orbit.</p>	A&A(1978)
	<p>The National Academy of Sciences released a report of the ad hoc committee for review of the SSME development program. This review was requested by Senators Adlai E. Stevenson (D-ILL) and Harrison L. Schmitt (R-NM) in December 1977 as an independent assessment by the National Research Council of the safety of the SSME during both orbital flight and operational phases of the Shuttle program. The review was to be completed by the end of February 1978 for consideration during FY79 NASA authorization hearings.</p>	A&A(1978)
78/03/08	<p>MSFC managed a variety of ground tests at various locations in the U.S. to prove flightworthiness of the SRB. Test officials at MSFC put loads on a "short" version of the SRB to duplicate load conditions encountered by the Shuttle on the launch pad, in flight, during parachute deployment, and in water impact and recovery. Other MSFC engineers tested the flight system designed to gimbal the motor nozzles at the lower end of each booster to guide the Shuttle on a proper course. Other tests were conducted by UTC Chemical System Division and Thiokol's Wasatch Division. Airdrops of the entire parachute system were conducted at the National Parachute Test Range at El Centro, CA. Other tests, of the SRB's electrical system and prelaunch checkout system, were in progress.</p>	A&A(1978)
78/03/13	<p>Orbiter 101, the Enterprise, made its voyage to MSFC atop its 747 carrier aircraft from Ellington AFB. The operation took approximately 2 hours. The orbiter would be taking part in the MVBVT series at MSFC for a period of months.</p>	RIC-Chron
78/03/14	<p>Over 240,000 people came out to see the orbiter Enterprise upon its arrival at Johnson Space Center. Charles Biggs, JSC exhibits manager, said that JSC had made no effort other than the usual press releases to attract a crowd. A tour guide commented: "What I think is that this is different than Apollo and going to the moon. I think the Shuttle is coming closer to the people. It is something they can relate to. They wanted to know when they can go on it."</p>	A&A(1978)
78/03/17	<p>NASA announced it had selected four 2-man crews to begin training for orbital flights. Those chosen were John Young, commander, with Robert Crippen, pilot; Joe Engle, commander, with Richard Truly, pilot; Fred Haise, commander, with Jack Lousma, pilot; and Vance Brand, commander, with Charles Fullerton, pilot. Young and Crippen would crew the first orbital flight test (OFT-1)</p>	A&A(1978)

DATE	EVENT	SOURCE
78/03/17	<p>scheduled for launch in the spring of 1979 from KSC, with Engle and Truly as backup. NASA had also considered an OFT mission to boost Skylab into a higher orbit; prime and backup crews to implement such a plan would be selected from those already named.</p> <p>NASA announced the appointments of Neil Hutchinson, Charles Lewis, and Donald Puddy, all of JSC's Flight Operations Directorate, as Flight Directors for the first manned Shuttle orbital flight. Their duties would include planning and directing the activities of Mission Control Center during real-time Shuttle operations and integrating inputs from all Shuttle program elements, including NASA, contractors, and the scientific communities. Hutchinson would manage all activities associated with the Shuttle ascent phase; Lewis, the on-orbit phase; and Puddy, the orbiter reentry phase. All had served as flight directors during Apollo and Skylab missions.</p>	A&A(1978)
78/04/06	<p>AVIATION WEEK reported that mechanical failures during tests of the SSME threatened to delay the whole program, although the first orbital launch had been scheduled for 1979. Turbine blades in the engine's high-pressure fuel pump failed in three separate tests. Dr. Robert Frosch, NASA Administrator, said that the setbacks had not lessened agency confidence in the basic engine design and that the program should proceed on schedule; however, he admitted that chances of launching the first manned orbital flight in March 1979 were "considerably less than 50-50."</p>	A&A(1978)
78/04/07	<p>Flight testing of the microwave scanning beam landing system (MSBLS) began at KSC, with pilots and technicians using a specially equipped Jetstar aircraft operated by Dryden Flight Research Center to conduct the tests. The system verification tests were the initial checkout of the airborne MSBLS/Jetstar system and the ground stations equipped with laser systems to verify compatibility and check out the system processing test data. KSC scheduled five test flights lasting a total of about 12 hours.</p>	A&A(1978)
78/04/14	<p>Ground Vibration Test modification was completed at MSFC.</p>	RIC-Chron
78/04/21	<p>NASA reported that an ignition test on three SSNEs had been completed at NSTL. The firing, planned for 2.5 seconds, actually lasted only 1 second, but officials said the test met most of the objectives. A low temperature reading in the fuel pressure pumps caused premature cutoff. NASA and Rockwell engineers would decide whether to repeat the test before moving to the next phase of the program.</p>	A&A(1978)
	<p>The Enterprise made its first vertical ascent up the side of the dynamic test stand at MSFC. The 70-ton craft scaled the building, then was lowered down inside where it was mated to an ET for the first time. The two would undergo vibration testing at MSFC to qualify the joint spacecraft for flight.</p>	MSFC-Rel-78-49
	<p>The first static firing of MPTA-09B was conducted at NSTL for 2.5 seconds with stub nozzles.</p>	RIC-Chron
78/05/12	<p>NASA halted MSFC preparations for vibration tests of the orbiter Enterprise when the upper dome of the the prototype liquid oxygen tank buckled inward while being filled with water. Pressurizing the tank to one pound later removed the wrinkles. The tank implosion delayed Enterprise vibration testing, but the Shuttle Program Office needed to review the schedule to determine</p>	A&A(1978)

DATE	EVENT	SOURCE
78/05/12	whether or not the overall Space Shuttle program would be affected.	
78/05/19	The second static firing of MPTA-098 was conducted at NSTL for 15 seconds with 70% thrust and stub nozzles.	RIC-Chron
78/05/23	MSFC successfully completed an airdrop test of the SRB parachute recovery system at the National Parachute Test Range. This was the fourth drop test in which a dummy booster was carried aloft beneath the right wing of a B-52 aircraft. All three of the recovery system's main parachutes deployed and functioned as expected. The dummy booster landed virtually undamaged. NASA engineers planned to perform two more airdrops before certifying the system for flight.	M-STAR-05/31/78
78/05/24	MSFC reported it had successfully conducted a first major test firing of the three SSMEs during a 15-second run at NSTL in Bay St. Louis. MSFC had already successfully fired one of the modified engines for 520-seconds at 100% thrust, more power than needed for the first mission. Test results would aid in establishing countdown procedures. More than 300 contractor and NASA employees worked on the test series, described by program officials as the most complex large propulsion system evaluation undertaken in the U.S. Space Program. Test budget for firings and facilities was \$52 million.	A&A(1978)
78/05/30	The Mated Vertical Ground Vibration Test (MVGVT) series began at MSFC using a computerized shaker system turned on by engineers in instrumentation trailers located near the test stand. The shaker system, the modal test and analysis system (SMTAAS), had applied vibration cycles and force inputs and had acquired response information from the vehicle suspended inside a tall stand and canted 9 degrees from vertical. The boost configuration phase test was conducted on Orbiter 101 and a mated ET. In upcoming months engineers would use SMTAAS to "tune in" to the vehicles's various vibration modes, comparing responses to mathematical predictions. Results of the test would allow engineers to verify predictions of Shuttle reaction to the much more severe vibrations expected during launch.	RIC-Chron
78/05/31	NASA reported that it amended a contract with the Rocketdyne Division of Rockwell International Corporation to procure nine SSMEs, in addition to the seven already on order. The amendment authorized Rocketdyne to manufacture and test the nine engines during a 180-day period in which prices for the engines would be negotiated. Estimated cost of the amendment was \$250 million. The nine engines would support the program through the first four orbiters approved for production. The previous contract covered engines for the first flight scheduled for 1979 and included three ground test engines and one spare.	A&A(1978)
78/06/15	The main propulsion system was static fired successfully in a test lasting 50 seconds and reaching 90% thrust, and 5 seconds at 70% thrust with stub nozzles. This was the third test of the propulsion system which featured a cluster of three SSMEs installed in an orbiter aft fuselage section. Liquid hydrogen and liquid oxygen propellants were fed to the SSMEs from a flight type ET. The test was originally planned to last only 15 seconds; however, NASA extended the test duration on the basis of successful results from the first two tests. The purpose of the tests was to evaluate the performance of the complete propulsion system and verify it for operation prior to the first manned orbital flight. The test program was conducted under the direction of MSFC at NSTL.	MSFC-Rel-78-71; RIC-Chron

DATE	EVENT	SOURCE
78/07/00	NASA announced that Richard Smith, Deputy Director at MSFC, had been appointed Deputy Associate Administrator for STS at NASA Headquarters for a 1-year tour of duty beginning 15 August.	A&A(1978)
78/07/05	MSFC reported that electronic simulators for SSMEs, SRBs, and ETs passed tests designed to check Shuttle avionics during simulated missions. JSC would conduct Shuttle flight simulations in a Shuttle avionics integration laboratory (SAIL) for which MSFC engineers had provided a mated elements system. All avionics would work together in the SAIL for the first time in Shuttle flight simulation that would include part of the countdown under normal, abnormal, and certain failure conditions.	A&A(1978)
78/07/07	The fourth MPTA-09B static firing was conducted at NSTL. The No. 2 engine was fired at 70% thrust for 90 seconds. The No. 1 and No. 3 engines fired for 100 seconds at 90%-70%-90% thrust, all with stub nozzles.	RIC-Chron
	The main propulsion system completed its first series of live firing tests. Test engineers at MSFC reported that all major test objectives were achieved. The test version of the main propulsion system consisted of a cluster of three SSMEs mounted on an orbiter aft fuselage, plus a flight-type ET and associated systems. The four tests in this successful first phase were conducted at NSTL on 21 April, 19 May, 15 June, and 7 July. Systems were operated at thrust levels ranging from 70 to 90% of rated power for durations of up to 100 seconds. During the final test the engines were throttled from 90% thrust down to 70%, then back up to 90%.	MSFC-Rel-78-84
78/07/13	The MVGVGT test article was reconfigured from boost to launch at MSFC. Orbiter 101 was used in this phase of the tests. This change marked the end of the boost configuration phase of the MVGVGT.	RIC-Chron
78/07/20	Richard G. Smith, Deputy Director of MSFC, was appointed Deputy Associate Administrator for STS at NASA Headquarters. Smith was to begin a 1-year tour on 15 August, where he would report to John F. Yardley, Associate Administrator for STS. Smith was expected to assist Yardley in overseeing the development and operations of all of NASA's STS, including the Space Shuttle.	MSFC-Rel-78-84
78/07/26	The fifth air-drop test of the SRB's parachute recovery system was successfully conducted by MMC at the National Parachute Test Range, El Centro, CA.	MSFC-Rel-78-88
78/08/02	Work on the dynamics test stand had begun in preparation for the next series of MVGVGTs. After changing the configuration inside the stand from a "hanging" to a "sitting" arrangement, MSFC engineers adjusted the platform to fit the vehicle assembly. For the first series of tests, the orbiter and ET were suspended from airbags on a truss structure high in the stand, simulating the Shuttle after SRB separation and before the ET jettisoned. The next series would test the ET, orbiter, and SRBs mated in liftoff configuration--the SRBs would sit on a hydrodynamic support system to which the ET and orbiter had been attached.	A&A(1978)
78/08/22	NASA announced it had officially designated the orbital flight tests (OFT) as Space Shuttle 1 (SS-1), Space Shuttle 2 (SS-2), etc. Following orbital flight tests, the same designation system would continue for STS operational flights. For example, if the OFT phase had consisted of 6 flights, the next flight would	A&A(1978)

DATE	EVENT	SOURCE
78/08/22	be Space Shuttle 7 (SS-7). John Yardley, Associate Administrator of STS, had requested that emphasis be placed on a gradual conversion to the new official designation system.	
78/09/01	The USAF reported it had mapped and measured the air pressures and loads to be encountered during Shuttle launch. These tests were performed on the most detailed Space Shuttle models tested so far at AEDC. The 6-week program had was the first to use mockups of the complete Space Shuttle vehicle in AEDC's 16-ft transonic wind tunnel. NASA would compare the results of these comprehensive tests with data obtained at AEDC and elsewhere on smaller, less detailed Space Shuttle models. NASA would follow up on the AEDC transonic tests with supersonic tests of the same models at Ames Research Center.	A&A(1978)
78/09/06	MSFC announced it had test-fired a version of the rocket engine that would maneuver the orbiter at White Sands Test Facility on 6 September. The 10-second burn was the first firing of the 6000-lb thrust engine in combination with propellant tanks, feedlines, and other components of the orbital maneuvering subsystem (OMS) pod.	A&A(1978)
78/09/11	The SSME completed three test firings at NSTL at 100% of rated power level. Each engine ran the full length of time it would operate during an actual launch--520 seconds. All three tests were completed in a five day period beginning 7 September.	MSFC-Rel-78-102
78/09/12	MSFC reported that the final airdrop test of a system to retrieve SRBs by parachute had demonstrated that the system could save the boosters for reuse. This sixth airdrop on 9 December had successfully tested a main parachute under forces exceeding those expected during flight. A test vehicle released at about 6100 m altitude from beneath the right wing of a B-52 aircraft had deployed a test parachute when vehicle speed reached about 660 km per hr (410 mph).	M-STAR-09/19/78
78/09/20	NASA reported that a flight-configured SSME fired in tests at NASA's Bay St. Louis, MS, facility had exceeded 5000 seconds--the level to be met by a production engine to certify the SSME propulsion system for manned flight. Testing of the SSME had increased dramatically since 12 August, both in number of tests and time accumulated. Two engines had each accumulated approximately 7100 seconds of testing time, putting total engine-testing time over 25,000 seconds in 342 tests. Among these were five consecutive runs of 520 seconds, the length of time needed to put the Shuttle into orbit, on one engine at rated power level. Preliminary flight certification, which required a flight engine to have run 5000 seconds, was expected in the spring of 1979. Full-duration testing of the complete propulsion system would resume in early 1979 when the first manned orbital flight configuration engines would become available.	A&A(1978)
	The launch configuration portion of the MGVGT series began. The liftoff configuration was a mated ET/SRBs/Orbiter 101 assembly. The tests were conducted at MSFC in the dynamic test stand.	RIC-Chron
78/10/11	MSFC reported the first-time assembly of all Shuttle elements--two SRBs, an ET, and an orbiter--in the dynamic test stand at MSFC. The next step would be resumption of the MGVGT series, with the components in launch configuration. National and regional press representatives were present to film and report on the historic first assembly of the entire Space Shuttle vehicle. The SRBs would undergo launch configuration tests filled with inert propellant then be replaced	A&A(1978)

DATE	EVENT	SOURCE
78/10/11	by empty units for configuration tests representing the vehicle just before SRB separation.	
78/10/19	The SRM was successfully test fired in the Utah desert. The static firing portion of the third test ran the full 2-minute duration at which the SRM would operate during flight. The test was conducted near Proxometry Point, UT, by Thiokol, Wasatch Division.	RIC-Chron
78/10/24	NASA announced that fabrication and testing of components was continuing at various locations throughout the U.S. in preparation for a scheduled first manned orbital flight of the Space Shuttle. The date announced for the launch was 28 September 1979.	A&A(1978)
78/10/30	A single SSME was successfully static fired at NSTL for more than 13 minutes. The purpose of the test was to check the SSME's capability to return the orbiter to its landing site in case of a mission abort during launch. The engine operated continuously for 823 seconds, which is the longest burn time an engine should ever encounter during an actual Space Shuttle mission.	MSFC-Rel-78-119
78/11/15	Thiokol's Wasatch Division had delivered the last of eight empty SRB case segments for MSFC to use in the final burnout phase of MVBVTs scheduled for early 1979.	A&A(1978)
78/11/30	NASA announced that a frame structure for mounting experiments inside the Orbiter's payload bay had arrived aboard ship in Savannah and would be transported by tug to the Vehicle Assembly Building at KSC. The structure, called an Orbital Flight Test pallet (OFT), would be fitted with subsystems to provide electrical and other support services to the experiments. The pallet was designed and assembled by British Aerospace Corporation for the European Space Agency. MSFC was responsible for delivery and system integration of the OFT pallets.	NASA-Rel-78-182
78/12/05	The Aerospace Safety Advisory Panel had recommended elimination of the SRB's thrust vector control system (TVC) and modification or replacement of the orbiter's auxiliary power unit (APU). The panel said that, although the modifications could be expensive, the proposed changes should make the Shuttle a safer system during its operational phase. Panel members noted that such work might absorb the expected "Shuttle dividend", funds from declining Shuttle development costs that might be devoted to other programs. NASA Administrator Dr. Robert Frosch responded that NASA might apply the panel's proposals in designing its next space transportation system, instead of modifying the present system.	A&A(1978)
78/12/06	Early analysis of liftoff configuration vibration test results at MSFC revealed two primary deviations: excessive movement in a forward section of the SRBs that contained guidance gyros and a problem with transfer of loads at the attach points between the SRBs and the ET. After installing brackets to strengthen the boosters at the gyros location, NASA would conduct individual tests on the booster section at a test facility designed for smaller components.	A&A(1978)
78/12/15	Engineers from RIC and NASA were trying to determine why a liquid oxygen heat exchanger on an SSME had failed during a test at NSTL. This was the first failure of a heat exchanger (an engine component converting liquid oxygen to gaseous oxygen to pressurize the ET). Earlier in 1978, the National Research	A&A(1978)

DATE	EVENT	SOURCE
78/12/15	Council's Assembly of Engineering had noted that, although the exchanger had not encountered any difficulties, the system "poses a potential threat to the total shuttle system" from a single-point-failure standpoint. The committee said that, whereas redesign to add systems redundancy was impractical at that point, the system warranted continued examination for potential design improvements. NASA agreed with that assessment. Inflight heat exchanger failure might start a serious fire or explosion that could result in loss of a spacecraft. Failure during the test had resulted in some engine damage, but none to the test stand.	
79/01/11	Dr. Mike Malkin, Shuttle Projects Manager at NASA Headquarters, announced that there would be a further 6-8 week delay of the first launch. The delay was caused by the SSME fire 27 December 1978 at Bay St. Louis Test Facility. The fire destroyed an SSME intended for full-scale tests of a three-engine cluster and ET. Date of launch was set at 29 September. Original date was March 1979.	HSV-TIMES,01/12/79
79/01/20	NASA announced that the first Space Shuttle launch had been rescheduled for 9 November. The announcement was made by Dr. Robert Frosch, NASA Administrator. Frosch said that the date was based on the assumption that everything goes as planned.	HSV-TIMES,01/21/79
79/01/25	NASA announced that it had selected the names Columbia, Challenger, Discovery, and Atlantis for its planned fleet of orbiters. NASA Administrator Dr. Robert Frosch noted that Columbia, Challenger, and Atlantis were all ships that had played important roles in global exploration.	HSV-TIMES,01/25/79
79/01/30	The orbiter/ET/SRB burnout MVBVT started at MSFC.	RIC-Chron
79/02/05	NASA announced that a contract had been signed with Rockwell International, Space Systems Group, for the manufacture of two orbiters (OV-103 and OV-104), conversion of a ground test orbiter (OV-099), and modification of the first flight orbiter (OV-102). Under terms of the \$1.9 billion cost-plus-award-fee contract, Rockwell would perform the work at its Downey and Palmdale facilities and at KSC.	NASA-Rel-79-15
79/02/06	"Space Transportation Systems: 1980-2000", an assessment conducted by the American Institute of Aeronautics and Astronautics (AIAA), issued two proposals: that the Shuttle be upgraded; and that fully reusable Shuttles and advanced upper stages be developed. Development of such a vehicle would have renewed the the MSFC-JSC rivalry that was seen at the start of Space Shuttle project.	HSV-TIMES,02/06/79
79/02/12	The chairman of the House Committee on Science announced that the Committee may seek funding for a fifth orbiter. The chairman made the announcement while on a visit to MSFC. NASA originally wanted seven orbiters, a number later reduced to five, then cut to four in the last budget. Congress restored money for the purchase of orbiter parts that would take the longest to manufacture, but the fiscal 1980 budget included no such proposal.	HSV-TIMES,02/13/79
79/02/16	Testing of SSME was halted 2 weeks after it resumed. A spokesman for MSFC said that the tests weren't suspended, but probably would not resume until a valve seal problem found on 12 February was analyzed. Testing had resumed on 30 January with several ignition tests at the Rocketdyne test stand in Santa Susanna, CA.	HSV-TIMES,02/16/79
79/02/17	The fourth SRB firing was conducted at Thiokol. The SRM completed a series	RIC-Chron; MSFC-Rel-79-19

DATE	EVENT	SOURCE
79/02/17	of four developmental static firings. The final static firing was completed Saturday, 17 February at a test site near Brigham City, UT. During the 2-minute firing, the SRMs thrust level reached a peak of about 13 million newtons (3 million pounds). The system which gimbals the motor nozzle was operated over the most severe duty cycle expected to be experienced in flight. NASA officials in charge of the project reported that test objectives were fulfilled and that preparations would begin immediately for a series of three qualification test firings in the spring. The first development test firing was conducted in July 1977. Subsequent tests were completed in January and October 1978 and February 1979.	
79/02/23	Ground vibration testing of the Shuttle ended at MSFC. According to MSFC officials, the successful series of tests provided valuable information and confirmed NASA confidence in its ability to perform as designed. The test program, which began in May 1978, officially ended at 7:05 p.m. on 23 February. Eugene Cagle, manager of the vibration program at MSFC, expressed his confidence in the Space Shuttle as a flight vehicle, but said that much remained to be done in utilizing the test data.	MSFC-Rel-79-21
79/02/26	The Enterprise was set to leave Huntsville on 10 April. MSFC officials announced its launch vibration tests ended 23 February, apparently with the desired results. Plans had been drawn up for using it in payload testing at MSFC, but those were dropped in favor of tests in Florida.	HSV-TIMES,02/26/79
79/03/08	A scale model of Shuttle was fired at MSFC to learn how much noise would be made at liftoff. Engineers were concerned with the payload bay which sits very near to SSME and SRB exhaust, rather than with the ears of the audience. Ignition overpressure was being studied. A design requirement was for the noise level in the payload bay to stay below 145 decibels.	HSV-TIMES,03/09/79
	Preliminary studies have begun at MSFC to prepare for increasing Shuttle thrusting power attaching strap-on rocket motors to the SRBs. NASA officials had announced the thrust augmentation effort in testimony before Congress. John F. Yardley, Associate Administrator for Space Transportation Systems at NASA Headquarters, said that the additional thrust was necessary to insure that the full system payload deployment capability of 32,000 lbs could be achieved. Early definition work at MSFC was expected to lead to the awarding of a contract in FY80 for analysis, testing, and design of the selected strap-on concept. The strap-on motors would be attached to the rear section of the SRBs. To save costs, the strap-ons would contain no guidance systems and would not be recovered.	MSFC-Rel-79-23
	The orbiter Columbia rolled out of the hangar in Palmdale, CA. It took a snail-paced ride over 38 miles of Mojave Desert. The orbiter crept along at 5 mph to DFRC at EAFB, where it was to be bolted atop a 747 jet. The two would make a short hop to test that the heat shield tiles would not come off. From there they would take a 2-day journey ending at KSC.	HSV-TIMES,03/08/79
79/03/10	During a 17-minute test flight of Columbia, long strips of insulating tape, pieces of styrofoam, and ceramic tiles tore loose from the tail and fuselage. The tape and tiles were part of the system designed to shield the Shuttle from the intense heat it would encounter when reentering Earth's orbit. Technicians were inspecting the craft in an attempt to determine why it shed part of its heat protection.	HSV-TIMES,03/11/79

DATE	EVENT	SOURCE
79/03/17	SSME 2005, the first Shuttle flight engine, was delivered to NSTL. While at the facility, the engine would undergo acceptance test firings.	RIC-Chron
79/03/19	The NASA barge Poseidon, with an ET and other components aboard, pulled out from the NASA-MSFC dock on the Tennessee River to begin an 11-day trip to KSC. The items aboard the barge were to be used at KSC in "Pathfinder" operations--a checkout of movement and assembly "fit checks" at the Vehicle Assembly Building --and for training persons in "stacking" the Shuttle on the mobile launch platform. The ET had been used at MSFC for MVGVY during the past several months.	MSFC-Rel-79-27
79/03/24	Ending its troublesome journey, Columbia arrived at KSC to the cheers of thousands of technicians. Test launch and flight had been scheduled for 9 November, but NASA Administrator Dr. Robert Frosch announced another possible delay. He expected the launch by the end of the year.	HSV-TIMES,03/25/79
79/03/28	A small Shuttle model underwent static test firing at MSFC and passed with flying colors. The SSME fired, followed by the two strap-on SRBs. All of the components achieved full thrust.	HSV-TIMES,03/29/79
79/03/29	MSFC completed a series of safety and quality readiness reviews of critical hardware and materials being manufactured for elements managed by the Center. The reviews, begun last October, were designed to verify that MSFC's hardware for the first launch met engineering requirements for safety and quality. They would also assure that subsequent hardware deliveries would meet these same safety and quality requirements. In the review, prime contractors, MHC, RIC and Thiokol, reported on the ET, SSME and SRBs respectively. Their reports covered contractor-vendor dealings, safety and quality systems, and safety-quality awareness efforts of their own operations as well as their vendors.	MSFC-Rel-79-36
79/04/10	The orbiter Enterprise, riding atop a Boeing 747, left MSFC on its way to KSC. The orbiter had undergone a long series of successful tests at MSFC and would be used in fitting checks on the launch pad at KSC.	HSV-TIMES,04/10/79
79/05/01	NASA announced today that it needed at least \$270 million--or possibly as much as \$600 million--to pay for cost increases and delays in the development and production of Shuttle. The overrun would bring the cost of developing the craft to almost \$9 billion. The original development cost was \$6.6 billion. Two congressional subcommittee chairmen stated that the overrun might be taken from other space programs.	HSV-TIMES,05/02/79
79/05/04	The fifth static firing of MPTA-098 with flight nozzles was conducted at NSTL. Because of a failure at 1.5 seconds, the firing would be retried at a later date.	RIC-Chron
79/05/10	A successful 1.5-second ignition test firing of three flight-type SSMEs initiated the second phase of verification testing of the main propulsion system.	MSFC-Rel-79-47
	Chairman of the House Science Committee ordered special congressional hearings to probe the cost schedule problems of the troubled Shuttle program. Representative Don Fuqua (D-FL), Chairman of the House Committee on Science and Technology, announced the planned hearings after NASA Administrator Dr. Robert Frosch announced cost overruns.	HSV-TIMES,05/10/79

DATE	EVENT	SOURCE
79/05/12	SSME 2007, the first of Columbia's engines to undergo a flight acceptance test, passed with flying colors when it was successfully fired for a 520-second endurance test run simulating a launch to orbit. Flight acceptance tests on SSME 2007 began on 25 April, with another test on 2 May, and concluded with this test.	MSFC-Rel-79-45
79/05/14	A developmental model of the SSME caught fire 4 seconds after the start of a planned 100-second run. A liquid hydrogen line ruptured outside of the SSME's nozzle. Oxygen rich conditions inside the engine damaged some parts. The cause of the fire was unknown. As a result, the start of a new test series at NSTL on a working model of the Space Shuttle had been delayed.	HSV-TIMES,05/15/79
79/06/05	The Senate approved an additional \$220 million for Shuttle. The funds were included in a \$4.96 billion authorization bill for NASA for FY80.	HSV-TIMES,06/06/79
79/06/12	Noise from a fuel pump sensor caused an early shutdown on an attempt to run a cluster of SSMEs through a simulated launch. The planned 520-second test firing ended less than 1 minute after it began. Officials reported that the SSME would be ready for flight by the November launch date.	HSV-TIMES,06/13/79
	The fifth static firing of MPTA-098 with flight nozzles was conducted. The scheduled long-duration test firing of the main propulsion system was terminated early but was still considered a success. The automatic cutoff after 54 seconds into the 520-second firing was attributed to an instrumentation problem. The test had been delayed previously when a research and development engine malfunctioned during a single engine test at Rockwell's test site in California.	RIC-Chron; MSFC-Rel-79-59
79/06/13	The first SRB qualification firing was conducted with a 122-second firing. Three test firings would qualify the SRB for use in the first flight. The test was conducted by Thiokol's Wasatch Division. The test firing was deemed "satisfactory" by George Hardy, manager of the SRB project at MSFC. Performance of this first flight-type motor proved the effectiveness of modifications incorporated into the motor and igniter designs as a result of data from four developmental motors that had been test fired previously.	MSFC-Rel-79-60
79/06/25	Columbia's ET was announced to be ready for flight. It would be shipped via barge from New Orleans to KSC on 29 June. It was scheduled to arrive on 5 July.	MSFC-Rel-79-66
79/06/27	The flight certification test firings for the SSMEs were concluded on 27 June with a simulated abort mission, which required the engine to fire for 823 seconds.	MSFC-Rel-79-69
79/06/28	NASA Administrator Robert A. Frosch announced that a complete review of the program had developed a new schedule. The maiden flight of the Shuttle would be delayed an additional 6 months if Congress did not approve an extra \$220 million to pay for costs incurred because of the Space Shuttle's problems.	HSV-TIMES,06/28/79
79/07/02	The second attempt to fire a working model of the SSME was cut short when the test ended almost 500 seconds early. The MPTA was to have run 520 seconds in a test but was cut off because of high temperatures in a turbopump exhaust. A small fire broke out during the shutdown but did not cause any damage.	HSV-TIMES,07/03/79
	The sixth static firing of MPTA-098 was conducted at NSTL with flight	RIC-Chron

DATE	EVENT	SOURCE
79/07/02	nozzles. The main fuel valve ruptured after 19 seconds.	
79/07/11	The first SSME for orbiter Columbia arrived at KSC.	HSV-TIMES,07/12/79
79/07/14	The HUNTSVILLE TIMES reported that former astronauts Duke, Worden and Gordon said that a lack of funds and insufficient backing by President Jimmy Carter had jeopardized the safety of the Space Shuttle.	HSV-TIMES,07/14/79
79/07/15	At a round of talks between the United States and the U.S.S.R. regarding "killer satellites", the Soviet Union demanded that the U.S. end development of its Space Shuttle as part of an agreement to prohibit antisatellite weapons.	FACTS-ON-FILE,1979,979D2
79/07/16	Structural testing of the liquid oxygen tank portion of the ET was underway at MSFC. The liquid hydrogen section of the ET and the intertank structure connecting it to the liquid oxygen portion had successfully completed structural testing at MSFC. Testing was conducted on a test tank, known as the Structural Test Article (STA), which was identical to the flight tank. MMC built the STA. The purpose of the structural test series was to verify tank design and validate the analytical math model. Engineers wanted to ascertain whether or not the tank would react as predicted with simulated flight loads. Test loads placed on the STA reached 140% of design limit to satisfy verification requirements.	MSFC-Rel-79-73
79/07/20	The last of three flight SSMEs destined to power the Columbia's maiden voyage passed its flight acceptance test with a successful 520-second firing, matching the running time required for flight to orbit. Following an electrical and mechanical checkout, the engine would be formally accepted from the contractor by MSFC officials. It would then be shipped to KSC late this month. The other two flight SSMEs had already passed their acceptance tests and were shipped to KSC several weeks prior. One of these engines was being installed in Columbia. All of the engines were designed, developed, and built by RIC, Rocketdyne Division, and were tested at NSTL.	MSFC-Rel-79-75
79/07/23	Twelve weeks of ground tests on the mockup orbiter Enterprise ended. The test series was deemed a complete success. Although the ground tests were successful, a new problem was discovered with the vehicle--there was a possibility of ice forming on the outside of the fuel tanks, which could fall off during launch and damage other parts of the ship.	HSV-TIMES,07/24/79
79/07/27	The next firing of the SSME cluster was set for 26 October 1979, according to Project Manager Frank Stewart. The MPTA was damaged during an attempted 520-second run. "Damage was minor," said Stewart, "but repairs are time consuming."	HSV-TIMES,07/27/79
79/08/07	The metal used in the ET was discovered to have soft spots because of a Reynolds Aluminum manufacturing defect. It was not known if early flight tanks would be affected by the problem or if it would delay the first launch. A joint investigation was being conducted by NASA, the FAA, and DOD.	HSV-TIMES,08/07/79
79/08/08	Richard G. Smith was named Director of the Kennedy Space Center, effective 2 September. Mr. Smith was Deputy Director of MSFC and for the past year had been Acting Deputy Associate Administrator for Space Transportation Systems at NASA Headquarters.	MSFC-Rel-79-85
79/08/17	The status of Shuttle and future space programs were discussed in a private	HSV-TIMES,08/17/79

DATE	EVENT	SOURCE
79/08/17	meeting between Representative Ronnie Flipppo (D-AL) and Dr. William Lucas, MSFC Director. Flipppo was on the House Space Subcommittee and was looking into the problems that were putting Shuttle behind schedule and over cost. MSFC was Flipppo's first stop; he also planned to visit KSC and JSC.	
79/09/07	The HUNTSVILLE TIMES announced that NASA had cut two test flights in an effort to keep its operational date from slipping into 1982. This cut also delayed the first Spacelab mission by 9 months. William Armstrong, Chief of Shuttle Mission Analysis and Integration at NASA Headquarters, said the Shuttle would fly four instead of six flights. The first operational flight was set for September 1981.	HSV-TIMES,09/07/79
79/09/17	The HUNTSVILLE TIMES announced that the House Science and Technology Subcommittee had concluded that the phased development of the SSME was one reason that the project's cost grew by \$317.9 million during an 8-month period.	HSV-TIMES,09/17/79
79/09/18	A top level management review concluded that the Shuttle project needed to improve status reporting and planning, strengthen organization, and improve financial reserves. The review was conducted by several experts selected by NASA to determine why Shuttle was running one year behind schedule and over \$500 million over budget.	HSV-TIMES,09/19/79
79/09/22	SSME 0105 was fired in two 1.5-second ignition tests but made it only half way through a planned 20-second test because of hot discharge in the high-pressure oxidizer turbopump.	HSV-TIMES,10/03/79
79/09/25	SSME 0105 made a planned 50-second firing.	HSV-TIMES,10/03/79
79/09/27	A successful test firing in Utah seems to put SRB one step away from becoming flight ready. DM-2 fired for about 2 minutes near Proxontory Point, UT. The countdown went well, the thrust vector control system worked, and there were no apparent problems.	HSV-TIMES,09/28/79
79/10/01	SSME 0105 made just 5.2 seconds of a planned 100-second firing because of instrumentation problems.	HSV-TIMES,10/03/79
79/10/03	The HUNTSVILLE TIMES reported that Texas A&M would conduct a 1-year test program on the fuel turbopump interstage seal of the SSME. This was the seal that failed in the last MPTA firing.	HSV-TIMES,10/03/79
79/10/10	SSME 0008 ran for 1.6 seconds, far short of the goal of 100 seconds because of test stand water pressure problems.	HSV-TIMES,10/17/79
	SSME 2004 ran for 10 seconds.	HSV-TIMES,10/17/79
	The HUNTSVILLE TIMES announced that cutting a metal groove in a valve housing was all that was needed to eliminate repetition of an accident that damaged an SSME system model. Dominick Sanchini, Vice President of RIC Rocketdyne Division, said that the groove was cut in the main fuel valve to redistribute stress that caused a rupture and fire on 2 July 1979.	HSV-TIMES,10/10/79
79/10/12	SSME 0008 ran for 100 seconds.	HSV-TIMES,10/17/79
	SSME 2004 ran for 823 seconds, which was abort duration.	HSV-TIMES,10/17/79

DATE	EVENT	SOURCE
79/10/16	The HUNTSVILLE TIMES announced that a management review requested by President Carter found that inadequate funding had kept the Shuttle managers from bringing enough effort to bear on technical problems.	HSV-TIMES,10/17/79
79/10/24	The scheduled sixth static firing of MPTA-098 with flight nozzles was scrubbed due to the over sensitivity of a hydrogen detector.	RIC-Chron
79/10/30	As of 30 October, NASA had firm payload commitments for the first 37 operational flights. The 47 payloads supported by these flights represented commitments by 14 governments and commercial and foreign users. NASA payloads accounted for 32% of these payloads, the DOD about 15%, and all other users about 53%.	NASA-Rel-79-142
79/11/04	The MPTA-098 static firing was conducted at NSTL with flight nozzles for 10 seconds. A high-cutoff steerhorn failure occurred. The No. 3 engine lost a cooling line that caused it to shut down oxygen-rich and damage its working parts.	RIC-Chron; HSV-TIMES,11/07/79
79/11/05	L. Michael Weeks officially replaced Richard Smith as Deputy Associate Administrator of Space Transportation Systems Acquisition at NASA Headquarters. Smith had been recently named director at KSC.	HSV-TIMES,79/10/31
	The HUNTSVILLE TIMES reported that federal agencies were investigating reports that RIC began in 1977 to hide cost overruns on Shuttle. The purported practice may have contributed to delays in acknowledging cost overruns. NASA was told of the situation in 1977.	HSV-TIMES,11/05/79
79/11/14	President Jimmy Carter told the head of NASA that he would give the Shuttle full financial support, even if it meant an extra \$300 million in the fiscal 1981 budget to keep the project moving ahead.	HSV-TIMES,11/15/79
79/11/17	The HUNTSVILLE TIMES reported that Glynn S. Lunney, Manager of Payload and Integration Development at JSC, was expected to go to Washington as Acting Associate Administrator for Space Transportation Operations.	HSV-TIMES,11/17/79
79/11/24	SSME 0008, a developmental engine was fired for 100 seconds in a green run to verify its performance with a stub nozzle. The engine was to replace one heavily damaged in the last MPTA test on 5 November.	HSV-TIMES,11/28/79
79/11/26	Stacking of the boosters for the first Shuttle mission was begun with the mounting of the left aft booster segment on a mobile launch platform at KSC.	HSV-TIMES,11/28/79
79/11/28	The HUNTSVILLE TIMES announced a NASA decision to repackage the first stage of the Titan III missile and put it under the Shuttle to help it boost military payloads from a California launch pad.	HSV-TIMES,79/11/28
79/11/30	President Jimmy Carter signed into law a FY80 military construction appropriations bill which provided \$7.7 million in FY80 for Air Force construction related to the Space Shuttle.	FACTS-ON-FILE,1979,94582
79/12/17	The sixth static firing of MPTA-098 was reconducted at NSTL for 554 seconds. Pogo and gimbaling tests were accomplished. The test occurred shortly after 11:00 a.m.	RIC-Chron; HSV-TIMES,12/18/79

DATE	EVENT	SOURCE
79/12/20	A mock liftoff and flight of the Columbia was completed at KSC. It was the first successful simulated flight after 4 days of repeated delays and failures. With prime crew members John Young and Robert Crippen at the controls, the Columbia was "launched" at 8:00 p.m. CST achieving simulated orbit 175 miles from earth 46 minutes later.	HSV-TIMES,12/20/79
80/01/08	According to a KSC spokesman, the left-hand SRB of the two SRBs which would boost Columbia on its maiden voyage was completely stacked. The right-hand SRB should be completed tomorrow.	HSV-TIMES,80/01/09
80/01/09	Astronauts completed a successful mock flight at Cape Canaveral. It was the second such mock launch in a month. Backup crewmen Air Force Col. Joe Engle and Navy Cdr. Richard Truly were in the cockpit for the 52-minute test, which included a simulated launch and flight into orbit. The test conductor, Gil Whittaker, said the test was "as smooth as it could be." He also said test officials hoped to conduct a similar test that same night with the prime crew members at the controls (Navy Capt. John Young and Navy Cdr. Robert Crippen).	HSV-TIMES,01/09/80
	SSME 2002 was fired for 520 seconds at NSTL.	HSV-TIMES,01/09/80
80/01/10	A simulated launch of Columbia was halted today when technical troubles developed 4 minutes 8 seconds into the mock launch. A computer detected trouble and stopped the countdown. Spokesman Dick Young said that two problems had caused the computer to stop the mock launch: a problem in the SSME No. 2 simulator and a problem with the ground hydraulic equipment which simulates components that control the Shuttle landing gear and thrust direction.	HSV-TIMES,01/10/80
	The SRBs which will boost Columbia on its maiden voyage were topped off with the stacking of the last booster section. Technicians from United Space Boosters, Inc., began stacking segments back in November. An ET will be hung between the two SRBs in February.	HSV-TIMES,01/11/80
80/01/11	Columbia passed its third simulated flight test of the week with astronauts Young and Crippen at the controls. The mock flight lasted about an hour and a half. The test included a simulated emergency in which one of the three fuel cells used to power the orbiter was shut down. The astronauts successfully simulated the procedure of restoring power to the fuel cell.	HSV-TIMES,01/12/80
	SSME 0007 was fired for 300 seconds on test stand A-3 in Santa Susanna, CA.	HSV-TIMES,01/11/80
80/01/15	SSME 0007 was fired for 300 seconds on test A-3 in Santa Susanna, Calif.	HSV-TIMES,01/15/80
	SSME 2004 was fired for 520 seconds at NSTL.	HSV-TIMES,01/15/80
80/01/17	Astronauts John Young and Robert Crippen completed a series of mock launch and orbit tests. The final test had begun with "liftoff" at 2:00 p.m. Monday, 14 January, and ended with "landing" at 10:00 a.m. 17 January. "Landing" was delayed earlier by the shutdown of one of the craft's five general purpose flight computers.	HSV-TIMES,01/17/80
80/01/28	Space Shuttle Columbia was powered up for tests of the brake antiskid system, the No. 3 general purpose computer, antennae, and other items.	HSV-TIMES,01/30/80

DATE	EVENT	SOURCE
80/02/08	A major milestone in SSME testing was reached when a flight configuration engine successfully completed the second series of tests preliminary to flight certification. The first test series ran from 27 March 1979 to 27 June 1979. This second series began 22 September 1979 and ended 8 February 1980. During the two test series, the engine accumulated a total of more than 10,000 seconds of firing time, equaling the firing time required for 19 flights of the Shuttle. A preliminary flight certification test series included at least 13 firings for a total of 5,000 seconds of firing time. Most of the tests in each series were conducted for 520 seconds at 100% of rated power level. However, in one of the tests, the engine was operated at 102% of rated power and in another, it was operated for 823 seconds, simulating an aborted mission.	MSFC-Rel-80-19
80/02/13	The SRB passed its last major test in a 2-minute firing at Promontory Point, UT. Data indicated that the motor burned for 119 seconds, about 1/3 second longer than planned.	HSV-TIMES,02/14/80
80/02/28	The second full duration test of the Shuttle main propulsion system was conducted successfully. MSFC officials said that all test objectives had been met during the 555-second firing. Cited as noteworthy was the fact that the trio of SSMEs used in the test system were successfully gimballed while the engines were being throttled back. More than 300 seconds of "pogo pulsing" enabled test engineers to explore the "whole spectrum of the pogo environment." Another important objective of this test was the demonstration of the ability of flight-type engine cut off sensors, located in the liquid oxygen feed lines, to cause shut down after the liquid oxygen tank was emptied, but before dry feed lines could cause damage to the engines liquid oxygen turbopumps. The test was conducted for MSFC by the Space Systems Group of RIC. It was the seventh test conducted on the MPTA-098.	MSFC-Rel-80-27
80/03/04	A plan to increase the cargo-carrying capacity of Shuttle for near polar orbit missions from Vandenberg was underway at MSFC. Contracts for program definition studies of a liquid propellant boost module to be attached to the ET had been awarded to MMC Denver Division and Aerojet Liquid Rocket Co. These studies were to involve adaptation of portions of the Air Force Titan launch vehicle to the Space Shuttle to provide additional thrust for launch.	MSFC-Rel-80-28
80/03/13	The first full power level test (109% of rated power level) of the SSME was successfully completed. The test consisted of a 125-second run on a single engine, 10 seconds of which was at 109%. A total of 26 seconds was run above normal rated power. Testing was conducted by Rocketdyne.	MSFC-Rel-80-36
80/03/20	The eighth static firing of MPTA-098 conducted at NSTL for 539 seconds. For the first time during main propulsion testing, the SSMEs were gimballed while a "pogo effect" was deliberately induced so that engineers could observe the vehicle's reaction to this combination. The test was to demonstrate the engine accumulator system's capability to prevent pogo during flight.	RIC-Chron; MSFC-Rel-80-41
80/03/21	The HUNTSVILLE TIMES announced that House Budget Committee announced that all general science, space, and technology funding would be cut by \$200 million instead of the \$760 million originally announced. The Space Shuttle was not included in the announced cuts.	HSV-TIMES,03/21/80
80/03/31	NASA released its revised budget plan. Total reduction in the budget plan is \$219 million bringing NASA's budget request down to \$5.58 billion. The entire	HSV-TIMES,03/31/80

DATE	EVENT	SOURCE
80/03/31	cut was within space flight operations and advanced programs. The \$1.873 billion requested for Shuttle was untouched.	
	The SSME was operated at 109% of its rated power for 6 minutes. This was the first sustained operation of the engine at full power level. The engine operated for a total of 10 minutes 10 seconds. This test's success was a major step toward removing barriers in engine operations.	MSFC-Rel-80-48; HSV-TIMES,04/02/80
80/04/09	All of the new strengthened heatshield tiles so far installed on the orbiter Columbia had passed proof tests as of this date, according to KSC officials. 581 "densified" tiles have been installed in recent weeks, and all have passed their proof tests. Densified tiles were developed to meet potential breakage problems. Completion of installation of the new tiles is expected in July.	HSV-TIMES,04/09/80
80/04/14	SSME was, for the second time, run at 109% of rated power. The 10-minute 10-second test firing met all objectives.	MSFC-Rel-80-55
80/04/16	The ninth static firing of MPTA-098 was conducted at NSTL. The No. 2 engine was shutdown at 4.6 seconds due to a discharge. There was overtemperature on a high-pressure fuel turbo pump.	RIC-Chron
80/04/19	The third static test of the SSME was completed. This was the final in a series of tests with simulated power levels necessary for an "abort to orbit" during a Shuttle launch. SSME 2004 was fired for 10 minutes and 10 seconds, with 6 minutes of the test at 109% power level. SSME 2004 had completed 12,911 seconds firing time, equivalent to 25 Shuttle flights.	NASA-Rel-80-55
80/05/13	NASA announced that it had selected the National Science Teachers Association (NSTA) for negotiation of a contract to manage the Shuttle Student Involvement Project.	NASA-Rel-80-65
80/05/22	The first launch was the victim of another delay. NASA announced that the new tentative date for launch was March 1981. The delay was necessary to gain additional confidence in the Space Shuttle's many complex systems.	HSV-TIMES,05/22/80
80/05/30	The ninth static firing of MPTA-098 was conducted at NSTL. The MPTA was successfully test fired for 9 minutes 38 seconds. This exceeded the duration required to place a Space Shuttle in orbit.	RIC-Chron; MSFC-Rel-80-79
80/06/01	SSMEs 2005, 2006, and 2007 of Orbiter 102 underwent a series of test firings. SSME 2005 was fired for 520 seconds; SSME 2006 for 520 seconds; and SSME 2007 for 520 seconds. The test series ended on 16 June.	RIC-Chron
80/06/02	The first of three SSMEs that would power Columbia on its maiden flight was retested, confirming flight readiness. During the 520-second, full-duration test firing, SSME 2005 ran at levels ranging from 65% to 100% rated power. SSME 2006 was to be tested on 3 June, and SSME 2007 was to be tested 2 weeks later when it would replace SSME 2005 on the test stand. Although the three had passed acceptance tests last year, retesting was desired because several minor modifications had been made since then.	HSV-TIMES,06/03/80
80/06/10	A "launch" was aborted by an engine failure just 4 1/2 minutes after "liftoff," forcing the crew to make a U-turn and return to the launch pad and	HSV-TIMES,06/11/80

DATE	EVENT	SOURCE
80/06/10	take off an hour later. The simulated launches took place with astronauts John Young and Robert Crippen riding a ghost Shuttle--an assembly of computers, earthbound cockpits, and mission control that electronically duplicates actions expected of Columbia. By 9:00 a.m. the simulation had been recycled, and they were flying again, this time all the way to orbit.	
80/06/16	The third and final SSME to be used to power Columbia's maiden flight was retested. The test firing lasted 8 minutes 40 seconds. All three SSMEs had now passed their retests. The engines would be transported to KSC to be mated to the orbiter Columbia.	HSV-TIMES,06/17/80
80/06/30	MSFC announced plans to reduce the weight of the ET by 6,000 pounds.	MSFC-Rel-80-93
	PAO announced that a \$230 million contract had been awarded to MMC Denver Division by MSFC for the initial phase of full-scale production of ETs.	MSFC-Rel-80-90
80/07/12	The tenth static firing of MPTA-098 was conducted at NSTL. The MPT test article was shutdown 105 seconds into the firing due to a burn through in engine No. 3's fuel preburner flight nozzles. The MPTA had achieved 102% thrust when it had to be shutdown. The firing was to have lasted 542 seconds. All engines and other aspects of the propulsion system apparently had functioned normally up to cutoff. Damage was confined to the No. 3 engine.	RIC-Chron; MSFC-Rel-80-97
80/07/14	The orbiter integrated tests were finished. The tests verified operation of Columbia's attitude and maneuvering rockets although they were not fired. The only problems were minor ones with ground and simulation equipment.	HSV-TIMES,07/16/80
80/07/23	An SSME was damaged during a test at power level recommended by a review panel. SSME 2004 was damaged while firing at NSTL. It was to fire for 823 seconds in the third of a series of certification tests at 102% power level. After 8.5 seconds, the test was cut off because of high temperatures in the liquid oxygen turbopump.	HSV-TIMES,07/27/80
80/07/28	In SSME tests, the standby engine for the orbital flight test program, SSME 0010, was fired for 1.5 seconds on test stand A-1 at NSTL. Although its serial number placed it in development rather than production (0 series instead of 2000 series), SSME 0010 would be used in case one of Columbia's SSMEs disqualified.	HSV-TIMES,07/30/80
80/07/30	SSME 0010 lost a pump during an acceptance test at NSTL.	HSV-TIMES,07/31/80
80/07/31	NASA confirmed a decision made earlier in 1980 to schedule the first Space Shuttle launch in March 1981. The announcement followed an intensive review of the Space Shuttle program carried out over the past several weeks. Dr. Robert A. Frosch, NASA Administrator, said the decision to continue the drive toward a March launch date was made even though the Space Shuttle program received a potentially serious setback with the SSME test fire of 12 July 1980.	MSFC-Rel-80-102
80/08/03	The SSMEs were installed in Orbiter 102 at KSC in preparation for STS-1.	RIC-Chron
80/08/06	MSFC was reactivating the Huntsville Operations Support Facility (HOSC), which was set up to support Saturn and Skylab launches. Plans were for HOSC to be used for several years of Space Shuttle flight. HOSC would not have a direct role in launching the Shuttle, but, if KSC crews encountered problems, HOSC teams would monitor their work and be ready to step in and offer solutions when	HSV-TIMES,08/06/80

DATE	EVENT	SOURCE
80/08/06	requested.	
80/08/14	Accidents that damaged three SSMEs would not delay the first launch. The solutions to the problems were relatively simple, according to a NASA spokesman. SSME 0006 was damaged in a test on 12 July; SSME 2004 was damaged in a test on 23 July; and SSME 0010 was damaged in a test on 30 July. Investigation boards at NSTL have analyzed data and reported back that the causes are easy to fix situations. No launch delay is anticipated.	HSV-TIMES,08/14/80
80/08/15	Engineers put 80,000 pounds of pressure on the SRB fittings to measure stress caused by ET shrinkage when filled with liquid hydrogen fuel at -420 degrees. NASA officials feared shrinkage would put unusual loads on the point where the ET is attached to the SRBs. Engineers said that they were pleased with the results of the tests.	HSV-TIMES,08/17/80
80/08/27	NASA announced four key dates for events which would precede the first launch, scheduled for March 1981. The dates were as follows: 1) 23-24 October, hang the ET between the SRBs which were already stacked on the mobile launch platform; 2) 23 November, roll Columbia from Orbiter Processing Facility to the VAB for mating with ET and SRBs; 3) 26 December, roll assembled Shuttle from VAB to launch pad 39-A; and 4) 7 February, fire the SSMEs for 20 seconds in a Flight Readiness Firing. If these dates were met, the stage would be set for a 10 March 1981 launch date.	HSV-TIMES,08/27/80
80/09/20	A test of SSME 0007, which fell 15 seconds short of its 300-second goal, was considered successful because the cutoff was caused by a problem in the command and data simulator. The test was conducted on test stand A-3 in California.	HSV-TIMES,10/01/80
80/09/23	Astronauts Joe Engle and Richard Truly were "launched" into orbit at 8:00 a.m. in a 56-hour imitation of the first mission. One of the three SSMEs was lost at 4 minutes 22 seconds, but abort of the mission wasn't necessary. Engle and Truly were backup crew for the first launch and prime crew for the second launch.	HSV-TIMES,09/23/80
	SSME 2008 was fired for 50 seconds on test stand A-2 at NSTL.	HSV-TIMES,10/01/80
80/09/27	SSME 0007 fired on test stand A-3 for 100 seconds as planned.	HSV-TIMES,10/01/80
	The first of two ships specially built to recover SRBs was commissioned in ceremonies held outside Jacksonville, Florida. United Technologies' UTC Liberty was scheduled to leave for KSC on 8 October and arrive 10 October, using the trip as a shakedown cruise. A second ship, the UTC Freedom, was to follow in early 1981. The ships were built by Atlantic Marine, based on designs used in vessels that tend offshore oil rigs. The first booster recovery ship, the Bering Seal, was such a vessel on lease. Delays in the first launch made the Liberty and Freedom available first.	HSV-TIMES,10/01/80
80/09/30	SSME 0007 on test stand A-3 in California fired 99.5 seconds as planned.	HSV-TIMES,10/08/80
80/10/02	SSME 0007 on test stand A-3 in California fired 100 seconds as planned.	HSV-TIMES,10/08/80
80/10/04	SSME 0007 on test stand A-3 in California fired 100 seconds as planned.	HSV-TIMES,10/08/80

DATE	EVENT	SOURCE
80/10/07	A launch simulation was held in mission control.	HSV-TIMES,10/08/80
	SSME 0007 was tested 137 seconds on test stand A-3 in California.	HSV-TIMES,10/15/80
	SSME 0009 was fired 520 seconds on test stand A-1 at NSTL.	HSV-TIMES,10/15/80
	Supplemental contracts for further program and design definition of a liquid propellant boost module to provide performance augmentation for the Shuttle were awarded to two aerospace firms by MSFC. Some augmentation of lift capability is needed for certain future missions to be launched from the West Coast. MMC Denver Division and Aerojet Liquid Rocket Co., Sacramento, CA, received the contracts to continue their work on the system that would increase the cargo-carrying capability by 12,000 lb. The module could be attached to the base of the Shuttle's large ET to provide additional thrust.	MSFC-Rel-80-126
80/10/08	The Huntsville Operations Support Center (HOSC) successfully conducted an "all systems test" on the ET.	HSV-TIMES,10/15/80
80/10/09	At MSFC, the third test of the booster thermal curtain overpressure panel was completed along with the thermal curtain rain shield testing.	HSV-TIMES,10/15/80
	SSME 0007 was fired 100 seconds on test stand A-3 in California.	HSV-TIMES,10/15/80
80/10/10	SSME 0009 was fired 520 seconds on test stand A-1 at NSTL.	HSV-TIMES,10/15/80
80/10/11	SSME 0007 was fired 100 seconds on test stand A-3 in California.	HSV-TIMES,10/15/80
	SSME 0008 was fired in a 1.5-second ignition test on test stand A-2 at NSTL.	HSV-TIMES,10/15/80
80/10/12	The HUNTSVILLE TIMES announced that contracts worth almost \$2 million had been awarded to two companies--Martin Marietta and Aerojet Liquid Rocket Company--to continue design work on an extra booster. Essentially, the module was a Titan III first stage repacked to fit under the ET.	HSV-TIMES,10/12/80
80/10/13	SSME 0008 was fired for 260 seconds on test stand A-2 at NSTL.	HSV-TIMES,10/15/80
80/10/15	SSME 0009 was fired for 520 seconds on test stand A-1. It was the fourth certification test, including a "green run" for a flight acceleration safety cutoff device.	HSV-TIMES,10/22/80
80/10/20	Engineers at MSFC have completed a series of vibration tests on a modified nozzle for the SSME. The tests were designed to determine if modifications to hydrogen lines on the nozzle will enable the lines to better withstand certain potentially damaging vibrations they will encounter during engine operations. Preliminary results of the tests looked good. The tests involved the nozzle's "downcomer" and "steerhorn" lines. The downcomer is a tube which carries supercooled liquid hydrogen fuel down the outside of the nozzle from the engine's high-pressure hydrogen turbopump. The steerhorn line distributes the hydrogen to a coolant inlet manifold which encircles the base of the nozzle. The hydrogen then flows upward through a network of smaller tubes to cool the nozzle and preheat the hydrogen fuel for combustion. There are three sets of downcomer and steerhorn lines on each nozzle.	MSFC-Rel-80-130

DATE	EVENT	SOURCE
80/10/20	Martin Marietta Aerospace was awarded a study contract to assist NASA in identification of technology requirements for Shuttle-derived launch vehicles. During the next 18 months, the firm would work with NASA in defining space mission and technology requirements, producing conceptual designs, and determining the economics of technology efforts applicable to Shuttle-derived vehicles. Work on the \$596,867 contract would be done by the Advanced Programs department at MMC's Michoud Division, New Orleans. The launch vehicle concepts to be studied would provide increased lifting capability and heavier cargo capacity than the present vehicle.	MSFC-Rel-80-155
	SSME 0007 was fired for 300 seconds on test stand A-3 in California.	HSV-TIMES,10/22/80
80/10/22	SSME 0009 was fired for 823 seconds at 102% on test stand A-1 at NSTL.	HSV-TIMES,10/29/80
80/10/25	SSME 0009 was fired for 520 seconds at 102% on test stand A-1 at NSTL.	HSV-TIMES,10/29/80
80/10/31	A blast of unknown origin occurred about half an hour after the last of two work crews left test site 500 on MSFC's east test area. The explosion demolished a 10-foot by 20-foot concrete building and ripped open hydrogen gas and water lines, but caused no injuries. The blast came about 4:00 p.m. in a building being fitted with instrumentation for tests on the SSME bearings.	HSV-TIMES,11/02/80
80/11/03	Columbia's ET was mated to its SRBs in the Vehicle Assembly Building at KSC in preparation for STS-1.	RIC-Chron
	The eleventh static firing of MPTA-098 was conducted at NSTL. There was a shutdown 20 seconds into firing due to burn-through in engine No. 2 nozzle.	RIC-Chron
80/11/05	SSME 2008 was fired on test stand A-2 for 520 seconds.	HSV-TIMES,11/13/80
80/11/06	SSME 0007 was fired on test stand A-3 for 10 seconds.	HSV-TIMES,11/13/80
	SSME 0009 was fired on test stand A-1 for 520 seconds. This was the sixth firing in 0009's preliminary flight certification series.	HSV-TIMES,11/13/80
80/11/07	The HUNTSVILLE TIMES announced that MSFC had issued a \$596,867 contract to Martin Marietta Aerospace, New Orleans, to study options for upgrading the Space Shuttle.	HSV-TIMES,11/07/80
80/11/08	SSME 0007 was fired on test stand A-3 for 10 seconds.	HSV-TIMES,11/13/80
80/11/10	SSME 2008 was fired on test stand A-2 for 520 seconds.	HSV-TIMES,11/13/80
80/11/11	SSME 0007 was fired on test stand A-3 for 15 seconds.	HSV-TIMES,11/13/80
	SSME 0009 was fired on test stand A-1 for 520 seconds. This was the seventh firing in the engine's preliminary flight certification series.	HSV-TIMES,11/13/80
80/11/13	SSME 0007 was scheduled to fire for 15 seconds on test stand A-3, but the engine only achieved a 3.7-second firing.	HSV-TIMES,11/19/80
	SSME 0009 was fired for 10 seconds on test stand A-1 at NSTL.	HSV-TIMES,11/19/80
80/11/15	SSME 0007 was fired for 15 seconds on test stand A-3 at Rockwell's Downey,	HSV-TIMES,11/19/80

DATE	EVENT	SOURCE
80/11/15	CA, facility.	
	SSME 2008 was fired for 823 seconds on test stand A-2 at NSTL.	HSV-TIMES,11/19/80
80/11/24	Columbia was at last rolled out of its hangar at 6:01 p.m. in a major step forward for the program. The whole event took less than half an hour. At 6:28, Columbia rolled inside the Vehicle Assembly Building. Work started soon after to mate Columbia to its ET and twin SRBs in the Vehicle Assembly Building.	HSV-TIMES,11/25/80
	The rollover of Columbia to the Vehicle Assembly Building was originally scheduled for 22 November 1980. The rollover was then delayed until 11:00 p.m. 23 November. A second delay set the rollover for 6:00 p.m. on 24 November. The rollover had been delayed at first in order to complete "gap filler" work. The second delay occurred when that fine detail work took longer than expected. Columbia had been in the Orbiter Processing Facility since March 1979. Once in the Vehicle Assembly Building, it would be mated to the ET and twin SRBs which were already on the mobile launch platform.	HSV-TIMES,11/23/80
80/11/26	Orbiter 102 was mated to the ET and SRBs in the Vehicle Assembly Building (VAB) at KSC in preparation for STS-1.	RIC-Chron
80/12/01	SSME 0007 was fired on test stand A-3 for 300 seconds.	HSV-TIMES,12/10/80
80/12/02	MSFC announced that assembly of the first lightweight ET began late in November at MAF. Work began with the precision trimming and welding of aluminum gore segments to form the aft dome of the liquid hydrogen tank. The first lightweight tank was expected to be complete and ready for delivery in the summer of 1982, in time to support the fifth launch. The modified tank would be 6,000 lbs lighter than its predecessor and would, therefore, increase the Space Shuttle's payload carrying capability by about that same amount.	MSFC-Rel-80-155
	SSME 0009 was fired on test stand A-1 for 10 seconds.	HSV-TIMES,12/10/80
	The fourth and final cycle of preliminary certification tests of the SSME flight configuration was completed. The cycle was concluded with a 10-second static firing of SSME 0009. This final series included 13 firings of the engine for a total of 5040 seconds. Most of the tests were run at 520 seconds (burn time required for a typical Space Shuttle mission), at 102% of the engine's rated power level. However, during one test, the engine was operated at 104% to demonstrate design margin. Also, in two other tests, the engine was fired for 665 and 823 seconds to simulate the longer firing times that would be required for aborted missions.	MSFC-Rel-80-158
80/12/04	MSFC engineers were working in teams around the clock to support the first major test of the Space Shuttle as an integrated flight system. The engineers, representing various MSFC activities, manned consoles in the support center to monitor data from the tests, much of which involved MSFC-developed hardware. The test, called the Shuttle Interface Test, was designed to test the mechanical and electrical systems among the various elements to verify functioning of the Space Shuttle's flight systems.	MSFC-Rel-80-161
	The eleventh static firing of MPTA-098 was conducted at NSTL. The main propulsion system was successfully fired for 9 minutes 51 seconds. The test exceeded the firing time required to place a Shuttle in orbit. The firing	RIC-Chron; MSFC-Rel-80-160

DATE	EVENT	SOURCE
80/12/04	brought the total test time on the main propulsion system to 53 minutes 17 seconds. The test was a retry of a firing originally attempted 3 November.	
80/12/05	SSME 2008 was fired on test stand A-2 for 250 seconds.	HSV-TIMES,12/10/80
80/12/06	SSME 0007 was fired on test stand A-3 for 300 seconds.	HSV-TIMES,12/10/80
	The complete Space Shuttle went through its first two simulated launches.	HSV-TIMES,12/17/80
80/12/12	SSME 2008 was fired on test stand A-2 for 520 seconds.	HSV-TIMES,12/12/80
80/12/15	SSME 0009 was fired on test stand A-11 for 823 seconds with spalled bearings to show that the SSME could operated under less than perfect conditions.	HSV-TIMES,12/17/80
	The Shuttle Flight Control Integrated Test, which began 10 December, was completed on this date. The test was designed to verify the ability of the orbiter's onboard computers to steer the SRBs during ascent into orbit.	MSFC-Rel-80-164
80/12/17	The complete Shuttle went through its third simulated launch at 4:00 p.m. CST in the first of several integrated tests (SIT). It ran until T+38 minutes when the second firing of the orbital maneuvering engine would be made to put Columbia in orbit. In the first attempt that day, the Columbia's flight computers terminated the countdown seconds before booster "ignition", just as they are supposed to do if a similar failure happened in a real countdown.	HSV-TIMES,12/17/80
80/12/19	The SRB thrust vector control system was test fired.	HSV-TIMES,03/01/81
80/12/29	In a 12-hour operation the Shuttle's entire assembly--the 75-ton orbiter, its 184-foot-long ET, and twin SRBs--was transported 3 1/2 miles and mounted on launch pad 39A in preparation for the spring liftoff.	HSV-TIMES,12/30/80
80/12/30	The SSME program took a major step with completion of the certification tests at 102% rated power. Full power (109%) was planned for later missions. The test series was completed with the following tests: SSME 2008 for 520 seconds on test stand A-2 and SSME 0007 for 300 seconds on test stand A-3.	HSV-TIMES,12/30/80
81/01/14	The SRB thrust vector control system was test fired for the second time.	HSV-TIMES,03/01/81
81/01/16	The HUNTSVILLE TIMES announced that NASA had decided to drop out of part of an Air Force project to develop an upper stage (later called IUS) for Shuttle cargoes. Instead, NASA planned to modify Centaur as an upper stage.	HSV-TIMES,01/16/81
81/01/17	NASA's test version of the Space Shuttle's main propulsion system successfully completed its last scheduled test firing before the maiden flight planned for March. The firing, which lasted 10 minutes, 29 seconds, was the twelfth and longest test. It brought the total firing time on the MPTA to more than one hour--the equivalent of more than seven flights. With this success, all main propulsion system test objectives for the first flight have been achieved. The cluster of three engines was fired at 100% of rated power level for 239 seconds, at which time one engine was shut down. This was done to simulate the inflight shutdown of an engine and an aborted mission where the crew would return the Shuttle to the launch site for landing. During this test, the ET was tested without its antigeysers line to verify feasibility of eventually removing	MSFC-Rel-81-8; RIC-Chron

DATE	EVENT	SOURCE
81/01/17	it from later ET versions.	
81/01/21	SSME 0009 was fired on test stand A-1 for 82 seconds in a zero gravity shutdown test which required a minimum of 30 seconds to reach the right pressure.	HSV-TIMES,01/28/81
81/01/22	ET LH2 Tank was loaded at KSC in preparation for STS-1. SSME 0007 was fired on test stand A-3 for 300 seconds.	RIC-Chron HSV-TIMES,01/28/81
81/01/23	SSME 0009 was fired on test stand A-1 for 80 seconds in a zero gravity shutdown test which required a minimum of 30 seconds to reach the right pressure. This was the second zero gravity test of SSME 0009.	HSV-TIMES,01/28/81
81/01/24	ET LO2 tank was loaded at KSC in preparation for STS-1.	RIC-Chron
81/01/25	MSFC amended a contract with Martin Marietta Aerospace, Denver Division, to add and modify tooling to support a production rate of 24 lightweight ETs per year. The amendment adds \$66.5 million to the existing ET design and development contract, bringing the total value of the contract to more than half a billion dollars. It called for the new and modified tooling to be in place at the production facility by 28 December.	MSFC-Rel-81-7
81/01/26	SSME 0009 was fired on test stand A-1 for 80 seconds in a zero gravity shutdown test which required a minimum of 30 seconds to reach the right pressure. This was the third zero gravity test of SSME 0009. The integrated electronics assembly (IEA) on the SRBs mated to Columbia in the Vehicle Assembly Building at KSC successfully passed tests. The IEA on the right-hand booster had previously been replaced. The tests concluded on 28 January.	HSV-TIMES,01/28/81 HSV-TIMES,02/04/81
81/01/27	The HUNTSVILLE TIMES reported that engineers at KSC were inspecting damaged foam insulation on the Columbia's ET to determine what repairs were needed. Two sections of foam insulation had come loose in the area of a bipod that attached the Shuttle's nose to the tank. It was believed to have been caused when the aluminum tank shrank slightly as supercold liquid hydrogen and liquid oxygen were loaded during tanking tests. The SRB aft and forward assemblies for the left-hand launch booster made a simulated flight.	HSV-TIMES,01/27/81 HSV-TIMES,03/01/81
81/01/29	The ground launch sequencer--the computer that controls launch events--was run through its paces. A plug-in test was set for 30 January, but minor problems delayed that test until noon 31 January.	HSV-TIMES,02/04/81
81/01/31	SSME 2009 started acceptance testing to be the flight spare for Columbia. Unlike a spare tire, the engine would not go up with the mission. It would be in standby so it could replace any of the three flight SSMEs--2005, 2006, or 2007--that might develop a problem. SSME 2009 began acceptance testing with a 1.5-second ignition test on stand A-2.	HSV-TIMES,02/04/81
81/02/02	NASA announced that a dress rehearsal of all aspects of the first Shuttle mission would be conducted in February to clear the way for the launch of the	MSFC-Rel-81-15

DATE	EVENT	SOURCE
81/02/02	<p>first orbital flight, scheduled for no earlier than the week of 5 April. The exercise would touch upon all segments of the mission--including countdown and launch, ascent and orbital operations, and reentry and landing under normal and abort conditions. The 11-day test series would involve operations at KSC, JSC, DFRC, MSFC, and WSMR.</p> <p>The first Shuttle launch was delayed 3 weeks because of problems with insulation on the ET and initial integration tests. NASA announced that launch was set for no earlier than 5 April. The Flight Readiness Firing (FRF) was set for 16 February, back from 10 February.</p>	HSV-TIMES,02/02/81
81/02/09	<p>SSME 0007 was test fired on test stand A-3 for 20 seconds.</p> <p>SSME 2009, on test stand A-2, completed firings for qualification as Columbia's flight spare. A 100-second firing on 3 February and a 520-second firing on 9 February completed the test series.</p>	<p>HSV-TIMES,02/11/81</p> <p>HSV-TIMES,02/11/81</p>
81/02/13	A final test of the Columbia's three SSMEs was delayed. The Flight Readiness Firing (FRF) had originally been scheduled for 10 February but was then delayed until 16 February. This newest delay pushed the test to 17 February.	HSV-TIMES,02/13/81
81/02/19	The HUNTSVILLE TIMES announced that the Reagan administration had decided to fund a space shuttle system of four orbiters with an option to purchase a fifth.	HSV-TIMES,02/19/81
81/02/20	A flight readiness firing (FRF) of the SSMEs in Orbiter 102 was conducted at KSC. Officials at KSC were visibly pleased with the countdown demonstration test and FRF. The firing exercised all of the systems and ground crews that would be needed to send Columbia into space. After several frustrating delays, the final hours of the countdown went well, with only a minor "beanie cap" failure.	RIC-Chron; HSV-TIMES,02/20/81
81/02/23	SSME 0110 was fired on test stand A-3 for 1.6 seconds. SSME 0110 was the rebuilt version of SSME 0010, which was destroyed during its initial test in July 1980.	HSV-TIMES,03/05/81
81/02/25	SSME 0110 was fired on test stand A-3 for 300 seconds. SSME 0110 was the rebuilt version of SSME 0010, which was destroyed during its initial test in July 1980.	HSV-TIMES,03/05/81
81/02/26	SSME 0006 was fired on test stand A-1 for 3.9 seconds. SSME 0006 was used for overspeed and shutdown tests.	HSV-TIMES,03/05/81
81/02/28	SSME 0006 was fired on test stand A-1 for 67 seconds.	HSV-TIMES,03/05/81
81/03/02	SSME 0110 was fired on test stand A-3 for 100 seconds. SSME 0110 was the rebuilt version of SSME 0010 which was destroyed during its initial test in July 1980.	HSV-TIMES,03/05/81
81/03/03	MSFC announced that testing of a method that would be used to repair areas of debonded insulation on the ET had been successfully completed. Testing was conducted at NSTL. During the test, insulation was applied to a version of the tank used to support testing of the main propulsion system. The insulation was	MSFC-Rel-81-32

DATE	EVENT	SOURCE
81/03/03	applied in the same manner it would be applied to the STS-1 flight tank. The tank was then filled with supercold liquid hydrogen and liquid oxygen to evaluate the method of repair. The results of posttest inspection and pull tests were satisfactory.	
	SSME 0006 was fired on test stand A-1 for 67 seconds.	HSV-TIMES,03/05/81
81/03/05	SSME 0006 was fired on test stand A-1 for 64.3 seconds in a zero-gravity shutdown test.	HSV-TIMES,03/10/81
81/03/06	SSME 0008 was fired in test stand A-2 for 100 seconds in a calibration test.	HSV-TIMES,03/10/81
81/03/08	Repairs began on the ET which was damaged in January 1981 when it was loaded with 1.6 million pounds of supercold fuel for the first time. Officials announced that the T-0 (takeoff time) for the first launch would be established after the successful conclusion of the "dry" countdown demonstration test and the high/low pressure tanking test.	HSV-TIMES,03/12/81
81/03/09	The ET for the second flight arrived at NSTL from MAF. The tank would be lifted into a vertical position and installed in the MPT test stand. It would then be filled with liquid hydrogen and liquid oxygen propellants during a 1-day test, scheduled for the first week of April. The purpose of this test was to validate, under cryogenic conditions exceeding the expected flight level, that the Thermal Protection System (TPS) was properly bonded to the tank's aluminum skin.	MSFC-Rel-81-32
81/03/18	James M. Beggs, a defense industry executive, was selected by President Reagan to be the next Administrator of NASA. Beggs served as Associate Administrator for Advanced Research and Technology in 1968-1969. The Administrator's post had been vacant since Dr. Robert Frosch left the agency 16 January 1981. Also announced was the choice of Dr. Hans Mark as Deputy Administrator.	HSV-TIMES,03/18/81
81/03/19	Columbia passed its final flight rehearsal in the morning, clearing the way for launch once tank repairs were completed. Crews at KSC conducted the "dry" countdown demonstration test with "launch" coming at 6:25 a.m. Few problems were encountered with the countdown. In a footnote to the test, six Rockwell employees working on the launch pad were overcome by nitrogen and a lack of oxygen in an engine compartment about 2 hours after the test. One worker, John Bjornstad, died as a result.	HSV-TIMES,03/19/81
81/03/24	Launch of the Shuttle was pushed back a few more days. The first of two key propellant loading tests was postponed from Monday, 29 March, to Wednesday, 1 April, pushing the tentative 7 April launch date back at least 2 days.	HSV-TIMES,03/24/81
81/04/01	A technician, Forrest Cole, died of injuries suffered during a rehearsal in March 1981 at KSC. This was the second fatality of that accident--the first was technician John Bjornstad.	HSV-TIMES,04/02/81
	Dr. Alan Lovelace, NASA Acting Administrator, announced that the Columbia launch had been moved to 10 April because of a problem involving hydrogen gas in the aft compartment of the Shuttle, which had caused the death of a contractor employee.	HSV-TIMES,04/01/81

DATE	EVENT	SOURCE
81/04/09	The HUNTSVILLE TIMES announced that the Shuttle launch had drawn the biggest tourist crowd to the Cape since Apollo 11. NASA estimated that 80,000 persons would be on the space center to view the launch while hundreds of thousands would watch from outside KSC.	HSV-TIMES,04/09/81
81/04/10	A computer problem delayed the liftoff of Columbia. The count had gone to within 16 minutes of launch when first a fuel cell problem and then a computer difficulty cropped up. The backup computer wasn't in sync with the four main computers which were to control Columbia in flight.	HSV-TIMES,04/10/81
81/04/12	The maiden launch of Columbia occurred. Columbia began its voyage with a flawless launch at 7:00:03.9 a.m. EST. The SSMEs fired first, taking just over four seconds to reach full power. The SRBs roared to life next, vaporizing their fuel at a rate of 8.5 tons a second. Columbia cleared the tower in 8 seconds and began the pitch-over to belly up position in which it would leave the Earth's atmosphere. Six minutes later, the SSMEs shut down, their job finished. Ten minutes into the flight, a signal from the ship's mass memory computer initiated an intricate, four-step thruster dance that lasted 7 hours and gradually nudged Columbia into its assigned 150-mile-high orbit. The first task of the crew was accomplished with the opening of the cargo bay doors. The crew of two was made up of commander John W. Young, 50, a space travel veteran, and first time space traveler pilot Robert L. Crippen, 43.	NEWSWEEK,04/27/81
81/04/13	With a firm electronic hand at the helm, Columbia sped around the globe in serene indifference to its onboard crew. The crew's working hours were spent testing the craft's flawless reflexes. There was plenty of time to devote to minor problems such as a flight recorder that failed to cycle off properly. A number of heat resistant tiles were seen to be missing from the pods housing the orbital rockets; however, the rocket pod area would not get dangerously hot during reentry and could survive the loss of a few tiles.	NEWSWEEK,04/27/81
81/04/14	In the early afternoon, Columbia glided silently to the ground at Edwards Air Force Base. East of the Botswana tracking station, Columbia's rockets fired in preprogrammed sequence to bring it into entry trajectory. In California, four T-38 chase planes scrambled to meet the Shuttle. At mission control, the actual and planned trajectories came together in a single line on the monitoring screen. Within 250 feet of the ground, Young deployed landing gear, and the Columbia touched down at 215 mph.	NEWSWEEK,04/27/81

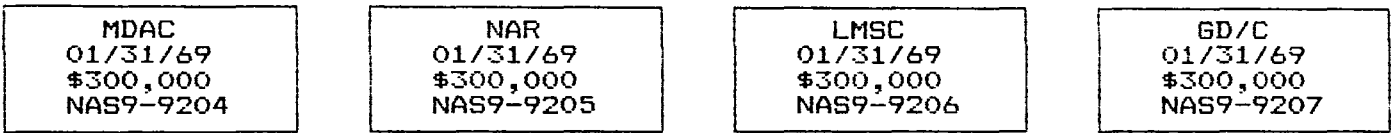
**APPENDIX A
MAJOR MILESTONE CHART**

60/07/01	Activation of Marshall Space Flight Center
69/04/24	First Meeting of the Space Shuttle Task Group (NASA/HQ)
72/01/10	Establishment of MSFC Shuttle Program Office
72/02/03	First Space Shuttle C/D SEB Convened
72/03/15	Space Shuttle Configuration Announced
72/04/04	SSME Contract Awarded to NAR Rocketdyne Division (NAS8-27080)
73/09/01	ET Contract Awarded to MMC (NAS8-30300)
74/06/26	SRM Contract Awarded to Thiokol (NAS8-30490)
75/06/07	First Ignition Test Firing of the ISTB at NSTL (the test series would include 8 ignition tests leading up to the mainstage SSME firing)
75/06/24	First Main Chamber Firing of the SSME at NSTL
76/09/17	Rollout of Orbiter 101 (Named "Enterprise" by President Gerald Ford on 8 September)
77/07/18	First SRM Firing by Thiokol
77/08/12	First Free Flight of Orbiter Enterprise
77/08/17	First ET Test Series Begins at MSFC
78/03/13	Arrival of Orbiter Enterprise at MSFC
78/04/21	Start of First MPT Series at NSTL
78/05/30	Start of MVGVT Test Series at MSFC
78/07/07	Completion of First MPT Series at NSTL
78/10/11	First Assembly of All Components at MSFC in Connection with the MVGVT Series (ET, 2 SRBs, and Orbiter Enterprise)

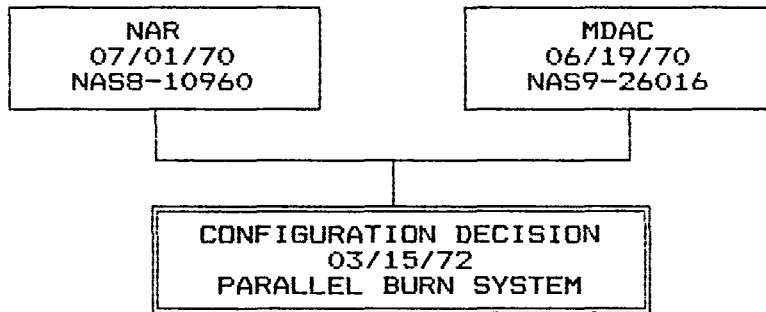
79/02/23 MVGVT Test Series Completed at MSFC
79/03/08 Rollout of Orbiter Columbia
79/06/13 First SRB Qualification Firing (QM-1)
80/06/30 ET Weight Reduction Program Plan
Announced
80/11/26 Mating of Columbia to ET and 2 SRBs at
KSC
80/12/29 Space Shuttle Assembly Mounted on Launch
Pad 39A at KSC
81/02/20 Columbia SSME Flight Readiness Firing
81/04/12 Launch of Columbia from KSC
81/04/14 Landing of Columbia at EAFB

APPENDIX B
SPACE SHUTTLE CONTRACT TREE

PHASE A

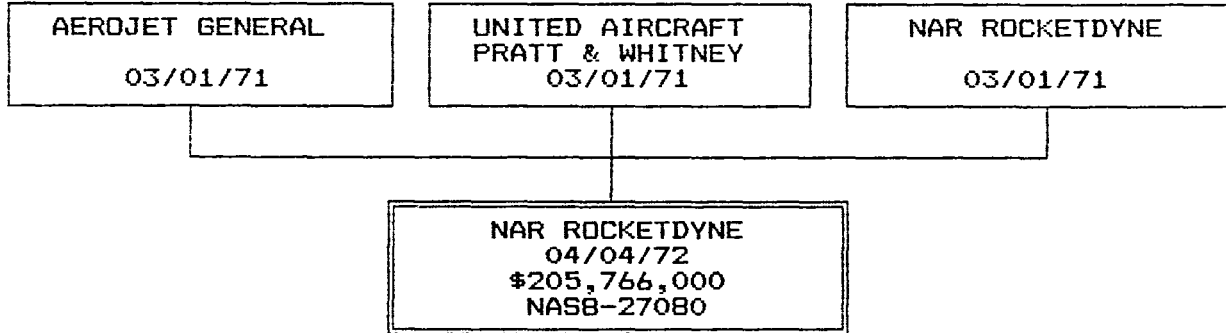


PHASE B

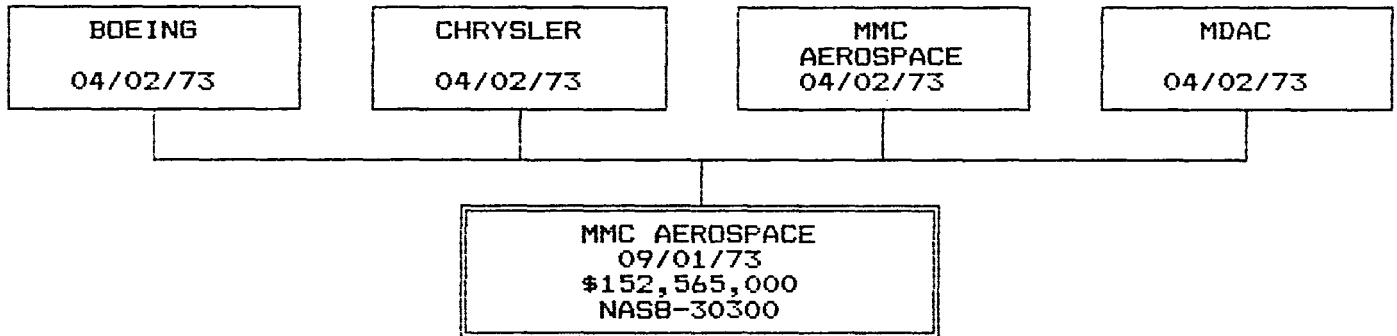


PHASE C/D
SPACE SHUTTLE PROPULSION SYSTEM (MSFC MANAGED)

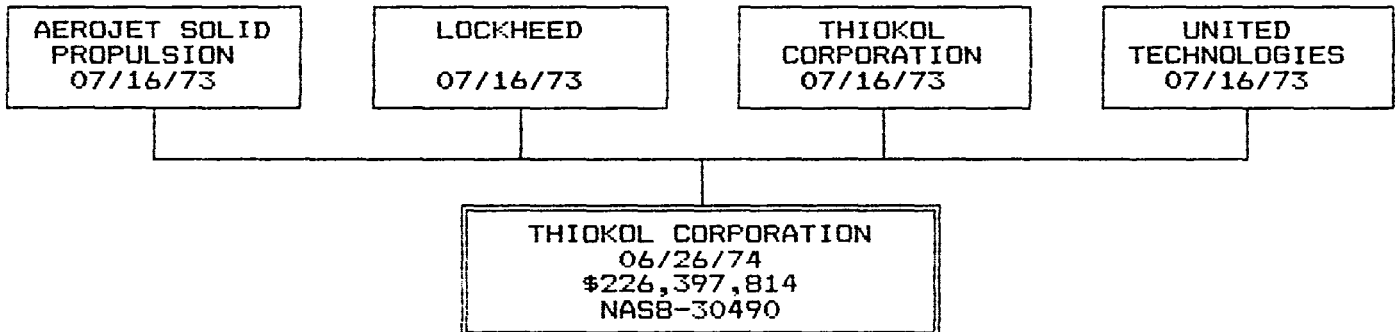
SSME



ET



SRM



APPENDIX C
PRE-DEVELOPMENT, ASSEMBLY, AND TESTING CHRONOLOGY

DATE	SYN
60/01/14	President Dwight Eisenhower directed the transfer of the Army Ballistic Missile Agency (ABMA) Development Operations Division and its space related missions to the National Aeronautics and Space Administration.
60/07/01	The George C. Marshall Space Flight Center (MSFC) was activated as the largest field organization of NASA with Wernher von Braun as director. Nearly 4,000 civilian employees and all technical facilities were transferred from the Army to NASA. MSFC would be located on Redstone Arsenal.
64/01/00	In a series of articles, AIAA's ASTRONAUTICS AND AERONAUTICS introduced discussion on several reusable launch system configurations. Under discussion were: earth-to-moon shuttles, nuclear shuttles, heavy launch shuttles (the Nexus concept), utility shuttles used for refueling (the Rombus concept), LOX/H2 powered shuttles launching vertically and landing horizontally (the Astroplane concept), fully reusable booster/spacecraft shuttles (the Astro concept), and three-stage rocket airplanes.
64/06/00	AIAA's ASTRONAUTICS AND AERONAUTICS recognized the following categories of possible reusable space vehicle concepts: Earth-orbital transports; interorbital space ferry vehicles, including Earth interorbital ferries, Earth-lunar orbit ferries, and Earth-planetary orbit ferries; lunar surface-to-orbit shuttles; and planetary surface-to-orbit shuttles. The publication estimated the earliest availability of any of the shuttles to be the late 1970s (with the Earth orbit-to-orbit shuttle), the latest availability being the late 1980s for the Earth-planetary orbit shuttles. Possible propulsion systems discussed included chemical propulsion, solid-core nuclear propulsion, nuclear-pulse propulsion, nuclear-electric propulsion, gas-core nuclear propulsion, and controlled thermonuclear propulsion. Reusable vehicle concepts included two-stage orbital transports.
65/02/00	In an editorial in AIAA's ASTRONAUTICS AND AERONAUTICS, member David Altman suggested that instead of powering future vehicles by either solid rockets or liquid rockets, space researchers should concentrate on boosters consisting of both types of rockets. Mr. Altman cited the strap-on system that had been successfully applied on the Titan III-C booster.
65/11/00	In AIAA's ASTRONAUTICS AND AERONAUTICS, Walter R. Dornberger of the Air Force stated that "A thorough and...necessary revision of our approach to space will involve a shift in emphasis to two new systems:" the reusable space shuttle and the multipurpose space station.
68/12/01	In the "Advanced Manned Missions" part of its SEMIANNUAL REPORT TO CONGRESS, NASA referred to the shuttle as a part of its planning for the future. This was the first such explicit reference to the shuttle in these SEMIANNUAL REPORTS.

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
69/01/31	NASA Awards Contracts for ILRV
69/02/10	Management of Space Shuttle Conceptual Studies Contracts Announced
69/04/03	Thomas O. Paine Becomes NASA Administrator
69/04/05	Space Shuttle Task Group (SSTG) Formed
69/04/24	Space Shuttle Task Group Holds its First Meeting
69/05/05	MSF Associate Administrator Conducts Contractor Briefing
69/06/12	SSTG Completes SPACE SHUTTLE TASK GROUP REPORT
69/06/20	Revised Phase ILRV Study Announced
69/06/26	SSTG Releases an Additional Volume of its REPORT
69/08/05	Testimony by Paine, von Braun, and Mueller on Future of Space Program
69/09/11	MSFC Given Responsibility for Shuttle Auxiliary Propulsion Development
69/09/15	Presentation of THE POST-APOLLO SPACE PROGRAM Report to the President
69/10/00	Two Decisions Made Concerning Shuttle Characteristics
69/10/03	Shuttle Assistant for MSC Flight Crew Operations Directorate Chosen
69/10/18	Joint Air Force/NASA Space Shuttle Design Criteria Review
69/11/10	Resignation of Dr. George E. Mueller Announced
69/12/01	MMC Submits Final Report of ILRV Phase A Study
69/12/10	Dr. George E. Mueller Resigns
69/12/16	Establishment of the Phase B Source Evaluation Board
70/01/00	Max Faget Announces Superiority of Two-stage Shuttle
70/01/12	Myers Replaces Mueller as Associate Administrator for MSF
70/01/16	MSFC and MSC Agree on Division of Auxiliary Propulsion System Duties
70/02/05	Contracts Awarded for Shuttle Test Stand Modification Studies

EVENT INDEX

DATE	EVENT
70/02/12	House Committee on Science and Astronautics Release Study
70/02/18	RFPs Issued for Definition and Planning of SSME Space Shuttle Phase B RFP Issued
70/03/00	OMSF Shuttle Program Office Established
70/03/19	TRW Delivers Proposal to NASA
70/03/30	MDAC and NAR Submit Phase B Proposal to the SEB
70/04/30	NASA Announces Selection of SSME Phase B Negotiation Contractors
70/05/04	Scale model of Orbiter Drop Tested at Fort Hood
70/05/06	Proposals Submitted for a Nuclear Space Shuttle
70/05/12	Selection of MDAC and NAR Space Division for Shuttle D&D Studies
70/05/19	MSC Shuttle Program Office Holds First Program Management Meeting
70/05/22	Three Contracts Awarded for Continuation of Nuclear Shuttle Definition
70/05/26	MDAC and TRW in Final Negotiations for Shuttle Propulsion Contract Possible Uses of Space Tug
70/05/27	Scale Model Dropped from a Helicopter as Part of Testing
70/06/07	Francis M. Stewart Presents Paper on Main Propulsion Requirements
70/06/09	Scale Model Tested at White Sands
70/06/15	Negotiations With Three Firms for Phase A Studies Announced SPACE SHUTTLE SYSTEM LEVEL II REQUIREMENTS Released
70/06/29	Space Shuttle Thermal Panel Repair Studies Assigned
70/06/30	Confirmation of Headquarters' Intention to Expand Phase B Scope
70/07/00	MDAC Awarded Study Contracts for Auxiliary Propulsion System (APS)

EVENT INDEX

DATE	EVENT
70/07/13	Space Shuttle System Ground Facilities RFPs
70/07/15	Conference on Space Shuttle Technology Held at LeRC
70/07/17	Firms Asked to Study Space Shuttle Vehicle Vents
70/08/00	Expendable Booster Versus Reusable Booster Discussed by MDAC
70/09/02	Award of Contract to MDAC and LTV Aerospace
70/09/15	Dr. Thomas Paine Resigns as NASA Administrator
70/09/22-23	SSME Requirement Review
70/09/30	McDonnell Douglas Makes First Phase B Quarterly Review at MSFC
70/10/02	Award of Contract to Ralph M. Parsons Co.
70/10/12	Tests Indicate Shuttle Landing Could Be Made By Professional Pilots
70/11/04	MSFC Seeks Bids on Space Shuttle Applications/Requirements Study
70/11/19	Award of Study Contract to MDAC
70/12/01	HEAO Meeting Held at MSFC SSME Design Review Meetings at MSFC
70/12/11	MDAC Space Shuttle Briefing at MSFC MSC Prepares Preliminary Draft of Space Shuttle Phase C/D SOW
70/12/15	MSFC Meeting to Review Studies of Chemical Interorbital Space Shuttle
71/01/00	Straight Wing Versus Delta Wing Discussed by Air Force
71/01/04	NASA Looking at Air Bases to Land Shuttle
71/01/08	RAM Proposals Submitted
71/01/12	MDAC Submits Mass Properties Status Review of Phase B Study
71/01/13	Calibration Completed on New Wind Tunnel
71/01/22	Reorganization of OMSE

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
71/01/29	NASA Management Council Directs Changes in Phase B, Level 1 Requirements
71/02/01	Announcement of First Horizontal and Orbital Flight Schedules
71/03/01	Announcement of SSME Testing Site (Mississippi Test Facility) Issuance of RFPs on Development of SSMEs
71/03/03	Von Braun's Remarks in Budget Request for FY72
71/03/11	Confirmation of Dr. Fletcher as NASA Administrator
71/03/15	AIAA Development, Testing, and Operations/NASA Technology Conference Lockheed Submits Status Report on Alternate Space Shuttle Concepts Study
71/04/00	Emphasis Shifted From Reusable Booster to Partially Expendable Booster
71/04/01	NASA Adds New Task to Three Space Shuttle Study Contracts
71/04/06	Space Shuttle Technology Conference at MSFC
71/04/12	RAM Definition and Design Contract Awarded
71/04/20	Announcement of Prototype Heat Protection System Contract
71/04/21	SSME Proposal Submitted
71/04/27	Dr. James C. Fletcher Becomes Administrator
71/05/16	RFPs for Space Shuttle Surface Materials Issued
71/05/22	Description of Future Space Shuttle Missions--Dale D. Myers
71/06/04	Lockheed Submits Final Report on Alternate Space Shuttle Concepts Study
71/06/10	NASA Announcement of OMSF Space Shuttle Program
71/06/16	NASA Interest in "Phased Approach" to Space Shuttle Announced
71/06/23	Reusable Chemical Propulsion Stage Study Contract Issued
71/06/24	Announcement of Contract to Develop Turbo Pump for Space

EVENT INDEX

DATE	EVENT
71/06/24	Shuttle APS
71/06/25	Rockwell Releases ORBITER EXTERNAL HYDROGEN TANK STUDY Rockwell Releases PHASE B FINAL REPORT
71/06/28	Lockheed Submits Final Report of External Hydrogen Tank Studies
71/06/29	Extension to Phase A Contract with Lockheed Extension to Phase B Contract with McDonnell Douglas
71/06/30	McDonnell Douglas Releases SPACE SHUTTLE SYSTEM PHASE B FINAL REPORT MDAC Releases EXTERNAL LH2 TANK STUDY FINAL REPORT
71/07/01	Space Shuttle Preliminary Design Contracts Extended
71/07/06	Extension of MDAC Contract for Space Shuttle APS Design Study Grumman Gives NASA ALTERNATE SPACE SHUTTLE CONCEPTS STUDY FINAL REPORT
71/07/12	Announcement of Negotiations for Development and Delivery of SSMEs
71/07/14	NAR Alternate Booster Contract Awarded TPS Contracts Awarded
71/07/22	MDAC Submits Results of Phase A Booster Study
71/08/03	Formal Protest Filed Against NASA by Pratt & Whitney
71/08/04	Space Shuttle Task Team Realigned
71/08/10	NASA Appropriation Bill Signed Into Law
71/08/12	Contracts Awarded to Textron, Bell Aerospace, and Rocketdyne
71/09/01	Signing of SSME Design Contract with NAR Rocketdyne Division
71/09/10	McDonnell Douglas Reduces Number of Configurations Under Consideration
71/09/30	Conceptual Drawings of Booster Completed

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
71/10/07	Extensions to Space Shuttle Phase B Development Contracts
71/10/27	McDonnell Douglas Review at MSFC
71/11/01	Feasibility Studies Contracts for Booster Awarded
71/11/03	McDonnell Douglas Conducts OMSF Design Review
71/11/10	Feasibility Study Contract of Space Shuttle Fly-away Airport Awarded
71/11/15	Lockheed Submits Alternate Concepts Study Extension Final Report
	McDonnell Douglas Submits Final Report on Phase B Contract Extension
71/11/18	Number of Configuration Options Being Studied by NASA
71/11/19	MSFC Awards Booster Study Contract to Chrysler
71/12/01	A&A Article by I. Irving Pinkel of LeRC Regarding Safety Problems
71/12/09	McDonnell Douglas Presents Design Review at MSC
71/12/15	Lockheed Presents Review of Alternate Concepts Study Extension
	McDonnell Douglas Presents OMSF Review
	Shuttle Aerothermodynamics Technology Conference at Ames
71/12/22	Announcement of 1-month Extension of Rocketdyne Contract
71/12/29	Administrators Meet to Decide on Space Shuttle Configuration
71/12/30	Award of Contract to Aerospace Corporation
72/01/00	Aerospace Corporation Submits Integrated Operations Analysis
72/01/05	Donlan Officially Announces Decision to Build Space Shuttle
	President Nixon Announces Decision to Proceed with Space Shuttle
72/01/10	Establishment of MSFC Shuttle Program Office
	Events Leading to President's Endorsement of Space Shuttle

EVENT INDEX

DATE	EVENT
72/01/10	Reported
72/01/13	Selection of Companies to Analyze Possible Use of SRMs
72/01/25	Subcommittee Status Report to House Committee on Science/Astronautics
72/01/31	Release of ECONOMIC ANALYSIS OF THE SPACE SHUTTLE SYSTEM by Mathematica
72/02/03	First Space Shuttle Phase C/D Source Evaluation Board Convened
72/02/04	Announcement of NAR Rocketdyne SSME Contract Extension Award of Contract to Conduct Orbiter Approach & Landing Simulations
72/02/22	OMSF Design Review Examines Phase B Configurations
72/03/07	Extension of NAR Rocketdyne SSME Interim Contract
72/03/15	Announcement of Space Shuttle Configuration Lockheed Publishes Phase B Space Shuttle Concepts Final Report McDonnell Douglas Submits Phase B System Final Report
72/03/17	Request for Proposals for Development of Orbiter & Integration Systems
72/04/04	Award of SSME Development/Production Contract to Rocketdyne
72/04/12	NASA Space Shuttle Technology Conference
72/04/14	Launch and Landing Sites Chosen
72/04/20	Approval of FY73 NASA Authorization Bill
72/05/12	MDAC Orbiter Design Study Extended Space Shuttle Contract Technical Proposals Submitted to MSC
72/05/16	MSFC Reaches Facilities Agreement With U.S. Army Corps of Engineers
72/06/21	Proposals Submitted for SRB Recovery System
72/06/24	Survey of KSC Launch Site Announced

EVENT INDEX

DATE	EVENT
72/07/00	Cost Estimates and Scheduling for Space Shuttle Released
72/07/01	Dr. Wernher von Braun Retires from NASA to Join Fairchild
72/07/10	Three Contract Awards Announced by MSC for Space Shuttle Work
72/07/26	Orbiter Prime Contractor Negotiation
72/08/07	NASA Debriefs Companies Not Chosen in Phase Competition
72/08/09	Letter Contract with Rockwell Issued
72/08/15	Symposium on Composite Structural Materials for Space Shuttle Application
72/08/16	SSME Prime Contractor Contract Signed
72/09/06	Water-entry Simulation Test Series Announced
72/09/07	MSFC Conducts ET and SRB Review
72/10/00	NAR Space Division Establishes Shuttle Development Baseline
72/10/05	NASA Administrator Issues Report on NAR Selection
72/10/31	NASA Decision on Subcontracting to Foreign Companies Announced
72/11/13	NAR Space Shuttle Program Requirement Review
72/11/21	Issuance of Requests for Space Tug Systems Proposals
72/12/12	Second Review of ET and SRB Plans
72/12/15	Major Down-Sizing of the Space Shuttle Approved
73/01/05	Reduction in Manned Space Flight Delays Shuttle
73/01/26	Announcement of Award of Contract to the Charles Stark Draper Lab
	Dr. Rocco A. Petrone becomes MSFC Director
73/02/10	Water Impact and Towing Tests of SRB
73/02/13	Establishment of Space Tug Task Team
73/02/14	Selection of Firms to Negotiate Contracts for Space Tug Studies

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
73/02/17	Nixon Signed into Law the Bill Changing MSC to JSC
73/03/06	Third Quarterly NASA/Contractor Space Shuttle Review
73/03/07	Preliminary Bioresearch Lab Simulator Delivered to MSFC
73/03/09	SPACE SHUTTLE-SKYLAB, 1973: STATUS REPORT Submitted
73/03/15	JSC Issues RFPs to Build Space Shuttle Hydraulic Actuators
73/03/29	Subcontracts Awarded for Orbiter Design and Fabrication
73/04/02	Request for ET Design, Development, and Production Proposals
73/04/16	Refinement of a Lightweight Version of the Space Shuttle
73/04/17	Orbiter Contract with Rockwell Announced
73/05/02	Space Shuttle Development Wind Tunnel Data Contract Announced
73/05/31	Receipt of ET Proposals
73/06/00	AIAA Article Emphasizes Desirability of Single Stage Shuttle
73/06/18	RIC Space Division Announced Award of Subcontract to LTV Aerospace
73/06/26	Selection of Engine to be Used on Orbiter
73/07/16	Requests for Proposals for Development of SRMs Issued
73/07/23	President Signs HR 7528 into Law (FY74 NASA Authorization Bill)
73/08/03	Receipt of Proposals for Structural Test Data Acquisition System
73/08/14	Intergovernmental Agreement for Cooperation with Space Shuttle Signed
73/08/16	Selection of MMC for ET Contract Negotiation
73/08/27	MSC Officially Rededicated as JSC
73/08/31	Receipt of SRM Development Proposals
73/09/01	Contract to MMC
73/10/30	Dr. Fletcher Testifies at Senate Aeronautical Committee

EVENT INDEX

DATE	EVENT
73/10/30	Hearings
73/11/05	Return Payload Limit Increased
73/11/20	Drop Testing of SRB Model and SRB Recovery System Prime Contractor for SRMs Announced
74/01/09	Lockheed Asks GAO to Set Aside Thiokol's Selection for SRM Contract
74/02/08	Contract Issued for Modifications of Test Facilities at MTF
74/02/13	Contract Awarded to Thiokol Chemical for Studies and Design
74/03/00	Single Stage Shuttles Exalted by AIAA Member
74/03/05	Reorganization of NASA Headquarters and MSFC
74/03/23	Key Appointments in MSFC Space Shuttle Program Become Effective
74/04/01	Construction of Space Shuttle Runway Begins
74/04/08	McDonnell Douglas to Negotiate Space Shuttle Support Contract
74/04/17	Award of Contract for Construction of SSME Test and Industrial Facilities
74/04/26	Award of Contract for Design Engineering Support Services
74/05/08	Yardley Named Associate Administrator for MSF
74/05/15	RFPs Announced for Two Space Tug Studies
74/05/17	IBM Selected to Design, Develop, Implement Computing System
74/05/20	Announcement of Continuation of Thiokol Contract
74/06/00	United Technology Center Submits Proposal for Backup
74/06/14	Mississippi Test Facility's Name Changed
74/06/17	Dr. William R. Lucas Becomes Director of MSFC Use of Boeing 747 Aircraft as Space Shuttle Ferry Announced

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
74/06/18	Award of Contract to ITT for Two-way Optical Data Link
74/06/22	Nixon Signed NASA's H.R. 13998 into Public Law 93-316
74/06/27	Thiokol Awarded SRM Contract
74/07/11	RIC Space Division Awarded Supplemental Orbiter Contract
74/07/26	MSFC Announced the Award of Six Contracts for Space Tug and IUS
74/08/28	Award of ET Support Contract
74/09/11	Lockheed to Subcontract Under Rockwell for Orbiter Testing
74/10/01	Formation of the Space Shuttle Operational Management Assessment Team
74/10/18	Announcement of Space Shuttle Landing Site
74/11/19	Wind Tunnel Tests of 4% Scale Model of Orbiter
74/12/04	Space Shuttle Cost and Review Committee Recommended Program Changes
74/12/23	Award of Planning Study Contract to McDonnell Douglas
75/01/00	Award of Contracts to Army Corps of Engineer
75/01/17	Request for Proposals for IEAs for the SRB
75/01/28	New Director of KSC
75/02/23	Criteria for Selection of Astronauts Discussed
75/02/24	Progress on Orbiter Reported to the Canadian Science Writers Association
75/02/28	Orbiter 102 Preliminary Design Review
75/03/24	Assembly of the First SSME Completed
75/03/25	Captive Static Firing Mishap Involving Two SRBs
75/04/01	MSFC Request to Sunstrand Corporation for APU Proposal Space Shuttle/Spacelab Connecting Tunnel Tested at MSFC
75/04/09	Dr. Rocco Petrone Leaves NASA
75/04/10	Arrival of First Space Shuttle Ground Test Hardware at MSFC

EVENT INDEX

DATE	EVENT
75/05/06	Award of SSME Subcontracts
75/05/15	Award of SRM Contract to Thiokol, Wasatch Division
75/05/27	Testing of 1/3 Scale Model of Orbiter in a Wind Tunnel
75/06/04	Announcement of Negotiations with Bendix for SRB Contract
75/06/07	Rockwell Conducted Ignition Test of ISTB
75/06/11	Award of ET Intertank Contract to Avco
75/06/18	Award of Space Processing Equipment Contracts to TRW and GE
75/06/19	FY76 Appropriations Bill
75/06/24	Development of Testing Technique for Space Shuttle Spray-on Insulation
	RIC Rocketdyne Test Fired Main Chamber of the SSME
75/06/30	Award of Contract to Air Products and Chemicals for LH2
75/07/01	Celebration of 15th Anniversary of MSFC
	Study of External Burning to Increase Efficiency of SRMs
	Testing of Space Shuttle Propellants at AEDC
75/07/09	Award of SRB Contracts
75/07/11	Award of Contract for MDMs to Sperry Rand
75/07/30	NASA Announces Selection of MMC for Support Contract
75/08/06	Announcement of Facilities Modification Contract to Alabama Firm
75/08/07	Announcement of Selection of United Technologies for BSM Negotiation
75/08/19	Announcement of Award to MMC for PICs
75/08/22	Announcement of Negotiation with MDAC for SRB Structures
75/09/02	SRB IEA Contract Awarded
75/09/10	Completion of SRB Towing Tests
75/09/17	Wind Tunnel Test of Space Shuttle Model at AEDC

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
75/09/28	Transfer of Programs to Different Offices
75/09/29	Space Shuttle Training Aircraft Test Flown
75/09/30	Acoustic Tests on Space Shuttle Model Resume
75/10/01	Orbiter Supplemental Development Agreement Signed with RIC
75/10/17	SSME Mainstage Test
75/10/18	Rockwell Charged with "Entertaining" NASA Employees
75/10/30	Modifications of Saturn V Test Stand Announced
75/10/31	SRB TVC Electrohydraulic Servoactuators Contract
75/11/00	KSC Vehicle Assembly Building Chosen for SRB Assembly
75/11/18	Report by Boeing on Space Shuttle Electrical Problems
75/12/10	Distribution of NASA Standard Parts List
	Space Station Concepts Reported
75/12/20	SSME 60 Second Duration Test
76/01/08	MSFC Seeks Proposals on SRB Parachutes
	SSME 0002 Arrives
76/01/31	SSME Test 901-037 Conducted
76/02/05	Subscale Thrust Chamber Assembly Test
76/02/06	MSFC Test Program Aimed at Reducing Space Shuttle Launch Noise
76/02/25	Commander of First Free-flight Test Chosen
76/03/10	SSME Test 901-043 Conducted
76/03/12	SSME Test 901-044 Conducted
76/03/24	New Spacesuit Design for Space Shuttle Travelers
76/03/25	MSFC Issues RFPs for SRB Assembly
76/03/31	First Test Firing of the Second SSME
76/04/07	Completion of Liquid Hydrogen Transfer Facility at NSTL
76/04/09	Center Director's Quarterly Review Held

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
76/04/13	Supplemental Funding for NASA Authorized by the House
76/04/16	Contracts for ET Test Towers at MSFC
76/04/17	Safety of Space Shuttle Nuts and Screws Questioned
76/05/07	Launch abort System Removed
76/05/18	Agreement Signed to Conduct Tests on Parachute Recovery System for SRB
76/05/24	SSME Controller Delivered to MSFC
76/05/26	Testing Begins on SRM Bearing
76/05/28	Martin Marietta Chosen to Produce SRB Decelerator Subsystem
	SSME Contract Extended
76/06/03	MSFC Issues Contract for Signal Conditioners
76/06/04	MSFC Issues Contract for Frequency Division Multiplexers
76/07/00	MSFC Activities in July 1976
76/07/08	Call Issued for Space Shuttle Astronaut Candidates
76/07/15	Space Shuttle Study Contract Awarded
76/07/16	First SSME Flight Configuration Nozzle Completed
76/07/21	Announcement of Contract Award to Martin Marietta, Denver Division
	Assembly of First ET Begun
76/07/29	MSFC Conducts Tank Tests
	Pneumatic Test Facility Completed at Michoud
76/07/30	SSME Test Fired for 650 Seconds
76/08/09	FY77 Budget's Space Share to Increase Only Slightly
76/08/13	Completion of Thiokol Facilities for Production of SRMs
76/08/20	Orbiter 101 Ground Vibration/Proof Load Tests
76/08/31	Selection of Three Firms for SRB Contract Negotiations
76/09/02	Three Dummy SSMEs for Orbiter 101 Received by RIC

EVENT INDEX

DATE	EVENT
76/09/03	Start of Hot-firing Tests of SRB Steering System
76/09/08	President Ford Names the First Orbiter "Enterprise"
76/09/17	Orbiter 101 Rollout
76/09/19	Relocation of Crew Training and Mission Control Activities
76/09/22	DOD Didn't Want Space Shuttle
76/09/27	Delivery of First SRB Production Case Segment to Thiokol
76/09/30	Firing of a Developmental Test Engine for the Space Shuttle
76/10/07	Contract Issued for SRB Location Aid Transmitters
	Modifications of the Space Shuttle Propulsion System Test Stand
76/10/22	Completion of Straddle Carrier Transporter
76/10/24	RIC Inspectors Find Fake Transistors
76/10/29	Modification of Saturn Facilities to ET Test Stand
	Selection of Bendix for Testing Equipment Contract Negotiations
76/12/17	Announcement of Selection of USBI as SRB Assembly Contractor
77/01/30	Enterprise Moved from Rockwell Plant to Edwards AFB
77/02/04	Announcement of Test Run Schedule for the Orbiter Enterprise
77/02/07	Use of Saturn Fabrication Tool to Solve ET Manufacturing Problem
77/02/15	Orbiter MGVT and Taxi Tests
77/02/17	Amendment of MMC Contract to Provide Additional Manufacturing Facilities
77/02/18	First Piggyback Ride of the Enterprise
77/02/22	Second Inert Captive Flight
77/02/25	Shipment of the First Piece of ET Test Hardware
	Third Inert Captive Flight

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
77/02/28	Award of Contract to United Technologies Corp. for Space Suits Fourth Inert Captive Flight
77/03/02	Fifth Inert Captive Flight
77/03/07	Possibility of Using ET as a Permanent Space Platform Considered
77/03/08	Amendment of Rocketdyne SSME Contract
77/03/09	Request for Increase in NASA's FY78 Budget for ET Facilities
77/03/11	Dynamic Testing of Parachutes to Recover SRBs
77/03/16	Announcement of Award of Contract to Sperry Support Services
77/03/17	NSTL's MPT Test Stand Turned Over to Rockwell
77/03/18	SSME Tested at Rated Thrust Conditions
77/04/05	Award of Contract to T.H. Taylor Construction for MVGVT Test Platforms
77/04/06	Award of Contract to Bryson Construction for Airfield Modification
77/04/07	LOX Tank of ET Undergoes Hydrostatic Tests
77/04/14	Award of Contract to Rockwell for Orbiter Support
77/04/22	First Two SRB Integrated Electronic Assemblies Received
77/05/01	Dr. James C. Fletcher Resigns as NASA Administrator
77/05/04	Contract Modification Awarded to RIC Rocketdyne in SSME Program
77/05/06	Announcement of Award to MMC for Construction of Test Stand
77/05/10	Completion of Tests on Liquid Hydrogen Tank
77/05/16	NASA Had Chosen "Key Missions" for the Orbital Flight Tests
77/05/24	Modification of Saturn Test Stand Completed
77/06/01	Announcement of SRB Parachute Test

EVENT INDEX

DATE	EVENT
77/06/03	Delay of Orbiter's First Manned Captive Flight
77/06/10	First Manned Test Flights of Enterprise Scheduled
77/06/15	Test of SRB Recovery System Successful
77/06/16	Wernher von Braun Dies
77/06/17	Award of Contract for Moving the Enterprise During MSFC Testing
	Major Constructions at KSC for Launching Space Shuttle
77/06/18	First Manned Flight of the Enterprise
77/06/20	Award of Contract with Rockwell for Modifications to the Orbiter
77/06/24	Orbiter Simulator Arrives at NSTL for MPT
77/06/28	Second Manned Inert Flight of the Enterprise Successful
77/07/15	Applications for Space Shuttle Astronauts Received
77/07/18	Largest SRM Ever Developed Test Fired
	NASA and India Sign Memorandum of Understanding
	RFP on Payload Missions Integration
77/07/20	Announcement of Planned Third Manned Inert Flight of the Enterprise
77/07/26	Third Manned Captive Flight
77/07/29	Shuttle Astronauts to Report to JSC for Interviews and Exams
77/08/01	Identification of About 40 Future Space Shuttle Payloads
77/08/12	First Free Flight of the Orbiter Enterprise
77/08/17	First Series of ET Tests Begun at MSFC
77/08/18	SRB Painting Changed to Save Money
77/08/30	Jettisoning Procedure Tested at MSFC
77/09/09	ET on the Way to NSTL for Testing
77/09/13	Second Free Flight of the Orbiter Enterprise

EVENT INDEX

DATE	EVENT
77/09/20	McDonnell Douglas Astronautics Awarded SSUS Contract
77/09/24	Third Free Flight of the Enterprise
77/10/12	Fourth Free Flight of the Enterprise
77/10/14	Two MSFC Scientists Chosen for Further Screening
77/10/26	Final Free Flight of Enterprise Successful
77/11/05	Preparation of Electronic Simulations of Space Shuttle Orbital Missions
77/11/11	Completion of ET Structural Tests
77/11/15	One Set of Ferry Flight Tests of the Enterprise Begins
77/12/05	Completion of Open Sea Tests on Space Shuttle Retrieval Equipment
77/12/09	Approach and Landing Tests Completed
77/12/13	Tanking Test Conducted on ET
77/12/23	Homemade Shuttle Makes Practice Run Through Marshall
78/01/01	Navy Divers Support Space Shuttle Weightlessness Tests
78/01/16	Selection of Astronaut Candidates
78/01/18	SRB Firing
78/01/23	Scheduling of Skylab Rescue Shuttle Mission
78/01/25	SRB Parachute Recovery System to be Tested
78/02/08	747 Orbiter Transport Arrives at Redstone
78/02/23	Orbital Flight Test Manager Selected
78/02/24	ET Scheduled to Arrive at MSFC
78/03/01	Completion of Tests Simulating Checkout of SRBs Components Arrive at MSFC for Vibration Tests National Academy of Sciences SSME Report Released
78/03/08	Variety of SRB Ground Tests Managed by MSFC
78/03/13	Enterprise Arrives at MSFC

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
78/03/14	JSC Questions the Supposed Lack of Interest in the Space Program
78/03/17	Appointment of Flight Directors at JSC Selection of Crews to Begin Shuttle Flight Training
78/04/06	SSME Test Failures Threaten to Delay Program
78/04/07	Testing of Space Shuttle Landing System (MSBLS) Begun
78/04/14	GVT Modification Completed
78/04/21	First MPTA-098 Static Firing First Vertical Ascent of the Orbiter Enterprise SSME Ignition Test Completed
78/05/12	LOX Tank Buckles in Tanking Test
78/05/19	Second MPTA-098 Static Firing
78/05/23	Completion of SRB Parachute System Test
78/05/24	First Major Test Firing of the Three SSMEs Successful
78/05/30	Start of MVGVT Tests
78/05/31	Amendment to Rocketdyne SSME Contract
78/06/15	Third MPTA-098 Static Firing
78/07/00	Richard Smith Appointed Deputy Associate Administrator for STS
78/07/05	Electronic Simulators of SSME, SRB, and ET Pass Avionics Tests
78/07/07	First Shuttle MPT Series Completed Fourth MPTA-098 Static Firing
78/07/13	Reconfiguration of MVGVT Test Article from Boost to Launch
78/07/20	Richard Smith Named Deputy Associate Administrator for STS
78/07/26	Fifth SRB Drop Test
78/08/02	Work Begun on Test Stand in Preparation for MVGVTs
78/08/22	Orbital Flight Tests Given a Designation System

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
78/09/01	Space Shuttle Air Pressures and Loads Tested by USAF
78/09/06	Orbiter Maneuvering Engine Test Firing
78/09/11	SSME Runs Full Duration
78/09/12	Final SRB Airdrop Test Demonstrates Reusability of Boosters
78/09/20	Flight-Configured SSME Exceeds Certification Level MVGVT Test Begun on Liftoff Configuration
78/10/11	First Assembly of all Components of the Space Shuttle
78/10/19	Third Test Firing of SRM
78/10/24	NASA Announces Date for First Manned Space Shuttle Flight
78/10/30	SSME Passes Test
78/11/15	Delivery of Empty SRBs for MVGVT
78/11/30	Experiment Pallet for Shuttle Flights Arrives from Europe
78/12/05	Aerospace Safety Advisory Panel Recommends Changes: TVC and APU
78/12/06	MVGVT Results Reveal Deviations
78/12/15	Failure of an SSME Liquid Oxygen Heat Exchanger Studied
79/01/11	Delay Looming for Space Shuttle
79/01/20	Launch Date Rescheduled
79/01/25	NASA Announces Orbiter Names
79/01/30	Start of Burnout MVGVT
79/02/05	NASA Signs Contract with Rockwell for Two Orbiters
79/02/06	Research Supports More Spacecraft
79/02/12	Committee May Seek Fifth Orbiter
79/02/16	SSME Testing Stopped by NASA
79/02/17	Fourth SRB Firing
79/02/23	MVGVT Completed at MSFC

EVENT INDEX

DATE	EVENT
79/02/26	Enterprise's Departure Set for 10 April
79/03/08	Columbia Roll Out
	Model Used for Space Shuttle Noise Test
	Preliminary Studies for Increasing Shuttle Thrusting Power Begins
79/03/10	Orbiter Sheds Part of Heat Shield
79/03/17	SSME 2005 Delivered to NSTL
79/03/19	ET Leaves MSFC Enroute to KSC
79/03/24	Orbiter Arrives; Frosch Expects Another Delay
79/03/28	Space Shuttle Model Static Test
79/03/29	Space Shuttle Elements Safety & Quality Review Series Completed Today
79/04/10	Enterprise Leaves MSFC
79/05/01	Space Shuttle Cost to Hit \$8 Billion
79/05/04	Fifth MPTA-098 Static Firing
79/05/10	Congressional Probe of Space Shuttle
	Space Shuttle Main Propulsion Test (MPT) Begins Second Phase
79/05/12	Columbia's First SSME Passes Flight Acceptance Test
79/05/14	SSME Fire Delays Test
79/06/05	Senate Approves More Money for the Space Shuttle
79/06/12	Fifth MPTA-098 Static Firing
	SSME Tests Shut Down Again
79/06/13	First Qualification Firing of SRB (QM-1)
79/06/25	First ET Ready for Flight
79/06/27	SSME Preliminary Flight Certification Completed
79/06/28	Launch Delayed
79/07/02	MPTA-098 Static Firing

EVENT INDEX

DATE	EVENT
79/07/02	SSME Test Halted
79/07/11	SSME Arrives at Cape
79/07/14	Ex-astronauts Pronounce the Shuttle Unsafe
79/07/15	U.S. and U.S.S.R. Meet in Switzerland Regarding Space Shuttle
79/07/16	Structural Testing of the LOX Tank of ET Gets Underway
79/07/20	Last of Columbia's Three SSMEs Passes Flight Acceptance Test
79/07/23	End of Enterprise Ground Tests
79/07/27	SSME Tests Delayed Until October 1979
79/08/07	ET's "Soft Spots" Discovered
79/08/08	New KSC Center Director Named
79/08/17	Flippo and Lucas Meet Privately
79/09/07	Two Shuttle Test Flights To Be Cut
79/09/17	Phased Approach Cited for Overruns in Space Shuttle Costs
79/09/18	Report Hits Delay of Space Shuttle Project
79/09/22	SSME 0105 Test Firing
79/09/25	Second SSME 0105 Test Firing
79/09/27	SRB Test Brings Flight Near Reality
79/10/01	Third SSME 0105 Test Firing
79/10/03	Texas A&M Negotiating SSME Contract
79/10/10	Space Shuttle Valve Fix Corrects SSME Problem
	SSME 0008 Test Firing
	SSME 2004 Test Firing
79/10/12	Second SSME 0008 Firing
	Second SSME 2004 Test Firing
79/10/16	Short Funds Cited as Top Drawback

EVENT INDEX

DATE	EVENT
79/10/24	MPTA-098 Static Firing Scrubbed
79/10/30	Space Shuttle Flights Booked
79/11/04	MPTA-098 Static Firing Failure
79/11/05	L. Michael Weeks Joins NASA Rockwell Under Investigation
79/11/14	President Carter Pledges Full Support for Space Shuttle
79/11/17	New Space Shuttle Director Named
79/11/24	SSME 0008 Fired
79/11/26	Boosters Readied for First Flight
79/11/28	Space Shuttle Payload Gets Titan Boost
79/11/30	Military Construction Bill Related to Shuttle Signed into Law
79/12/17	MPTA-098 Static Firing
79/12/20	Mock Space Shuttle Flight Successful
80/01/08	Left-hand SRB Completes Stacking
80/01/09	Astronauts Complete Mock Shuttle Launch and Flight SSME 2004 Firing
80/01/10	Space Shuttle Mock Launch Halted SRB Stacking Completed
80/01/11	Space Shuttle Mock Flight Successful SSME 0007 Firing
80/01/15	SSME 0007 Firing SSME 2004 Firing
80/01/17	Orbiter Integrated Tests (Mock Flights) Conclude
80/01/28	Columbia Powered Up for Test
80/02/08	Flight Configuration Engine Successfully Completes Test Series

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
80/02/13	Booster Test Said Successful
80/02/28	Successful Completion of Full Duration Test of MPTA-098
80/03/04	Space Shuttle Capacity for Polar Orbits to be Increased
80/03/13	SSME Passes First Full Power Test
80/03/20	Eighth MPTA-098 Static Firing
80/03/21	Shuttle Survives First Budget Cut
80/03/31	Shuttle Untouched by NASA Budget Cuts SSME Runs at 109% of Rated Power
80/04/09	Improved Tiles Pass Tests for Stresses
80/04/14	SSME Passes Second 109% Test
80/04/16	MPTA-098 Static Firing
80/04/19	SSME 2004 in Third Static Test
80/05/13	NASA Announces Selection of NSTA to Monitor Student Shuttle Projects
80/05/22	Delay of First Launch Announced
80/05/30	MPTA-098 Static Firing Reconducted
80/06/01	SSMEs on Orbiter 102 Undergo Series of Firings
80/06/02	SSME Successful Retest
80/06/10	Simulated Launch Aborted and Relunched
80/06/16	Third SSME Successfully Retested
80/06/30	NASA Awards ET Contract to MMC NASA to Reduce ET Weight
80/07/12	Tenth Static Firing of MPTA-098
80/07/14	Orbiter Integrated Tests Completed
80/07/23	SSME Damaged
80/07/28	Standby Engine Fired
80/07/30	Standby Engine Failure

EVENT INDEX

DATE	EVENT
80/07/31	First Space Shuttle Launch Date Announced
80/08/03	Installation of SSME's in Orbiter 102
80/08/06	HOSC Reactivated
80/08/14	MSFC Announces No Launch Delay from SSME Test Accidents
80/08/15	Successful Booster Tests at KSC
80/08/27	Four Key Prelaunch Dates Announced
80/09/20	SSME 0007 Tested
80/09/23	Mock Launch at JSC SSME 2008 Tested
80/09/27	Space Shuttle Booster Recovery Ship Gets Commission SSME 0007 Tested
80/09/30	SSME 0007 Tested
80/10/02	SSME 0007 Tested
80/10/04	SSME 0007 Tested
80/10/07	Launch Simulation Conducted Liquid Propellant Booster Module Contract Awarded SSME 0007 Tested SSME 0009 Tested
80/10/08	"All Systems Test" Conducted on ET
80/10/09	SRB Thermal Curtain Overpressure Panel Test Conducted SSME 0007 Tested
80/10/10	SSME 0009 Tested
80/10/11	SSME 0007 Tested SSME 0008 Tested
80/10/12	Extra Booster Proposed for Space Shuttle
80/10/13	SSME 0008 Tested

EVENT INDEX

DATE	EVENT
80/10/15	SSME 0009 Tested
80/10/20	Contract for Shuttle-derived Launch Vehicles Study Awarded Modified SSME Nozzle Vibration Test Series Completed SSME 0007 Test
80/10/22	SSME 0009 Test
80/10/25	SSME 0009 Tested
80/10/31	Explosion at MSFC Test Site
80/11/03	ET Mated to SRB for STS-1 MPTA-098 Static Firing
80/11/05	SSME 2008 Tested
80/11/06	SSME 0007 Tested SSME 0009 Tested
80/11/07	MSFC Issues Contract to MMC
80/11/08	SSME 0007 Tested
80/11/10	SSME 2008 Tested
80/11/11	SSME 0007 Tested SSME 0009 Tested
80/11/13	SSME 0007 Tested SSME 0009 Tested
80/11/15	SSME 0007 Tested SSME 2008 Tested
80/11/24	Rollover Delayed Rollover Finally Completed
80/11/26	Mating of Orbiter 102 to ET and SRB
80/12/01	SSME 0007 Tested
80/12/02	Assembly of First Lightweight ET Begins

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
80/12/02	Final Cycle of SSME Preliminary Certification Tests Completed SSME 0009 Tested
80/12/04	MPTA-098 Static Firing Retest MSFC Engineers Support Shuttle Interface Test at KSC
80/12/05	SSME 2008 Tested
80/12/06	Shuttle Goes Through Simulated Launches SSME 0007 Tested
80/12/12	SSME 2008 Tested
80/12/15	Space Shuttle Flight Control Integrated Test Completed SSME 0009 Tested
80/12/17	Shuttle Goes Through Third Simulated Launch
80/12/19	SRB Thrust Vector Test
80/12/29	Shuttle Mounted on Launch Pad 39A
80/12/30	SSME Certification Tests Completed
81/01/14	SRB Thrust Vector Test
81/01/16	NASA To Use Centaur as Upper Stage
81/01/17	Last Test Firing of MPTA Before Maiden Space Shuttle Flight
81/01/21	SSME 0009 Tested
81/01/22	ET LH2 Tank Loaded for STS-1 SSME 0007 Tested
81/01/23	SSME 0009 Tested
81/01/24	ET LO2 Tank Loaded
81/01/25	Lightweight ET Contract Amended
81/01/26	SRB IEA Tested SSME 0009 Tested

EVENT INDEX

DATE	EVENT
81/01/27	Leak Found in ET SRB Simulated Flight Conducted
81/01/29	Ground Launch Sequencer Tested
81/01/31	Columbia's Spare SSME Begins Acceptance Testing
81/02/02	Launch Delayed Again STS-1 Dress Rehearsal
81/02/09	Columbia's SSME Flight Spare Completes Acceptance Tests SSME 0007 Tested
81/02/13	FRF Delayed
81/02/19	Reagan Administration Supports Space Shuttle
81/02/20	Flight Readiness Firing of SSMEs in Orbiter 102
81/02/23	SSME 0110 Tested
81/02/25	SSME 0110 Tested
81/02/26	SSME 0006 Tested
81/02/28	SSME 0006 Tested
81/03/02	SSME 0110 Tested
81/03/03	SSME 0006 Tested Test of Repair Method for ET Debonded Insulation Completed
81/03/05	SSME 0006 Tested
81/03/06	SSME 0008 Tested
81/03/08	Repairs Begun on Damaged Launch ET
81/03/09	ET for Second Launch Arrives at NSTL for Testing
81/03/18	Beggs Named NASA Administrator
81/03/19	Columbia Passes Final Test; RIC Worker Dies
81/03/24	Launch Delayed Again
81/04/01	Launch Moved to 10 April

EVENT INDEX

<u>DATE</u>	<u>EVENT</u>
81/04/01	Second Shuttle Technician Dies
81/04/09	Tourists Gather at the Cape
81/04/10	Shuttle Launch Delayed by Computer Problem
81/04/12	Launch of Columbia
81/04/13	Columbia's Second Day in Space
81/04/14	Columbia Returns to Earth After First Flight

LOCATION INDEX

LOCATION	DATE	EVENT
AEDC	75/06/24	Development of Testing Technique for Space Shuttle Spray-on Insulation
	78/09/01	Space Shuttle Air Pressures and Loads Tested by USAF
AFSC	74/11/19	Wind Tunnel Tests of 4% Scale Model of Orbiter
	75/07/01	Study of External Burning to Increase Efficiency of SRMs Testing of Space Shuttle Propellants at AEDC
	75/09/17	Wind Tunnel Test of Space Shuttle Model at AEDC
AIAA	70/01/00	Max Faget Announces Superiority of Two-stage Shuttle
	70/08/00	Expendable Booster Versus Reusable Booster Discussed by MDAC
	71/01/00	Straight Wing Versus Delta Wing Discussed by Air Force
	71/03/15	AIAA Development, Testing, and Operations/NASA Technology Conference
	73/06/00	AIAA Article Emphasizes Desirability of Single Stage Shuttle
	74/03/00	Single Stage Shuttles Exalted by AIAA Member
	79/02/06	Research Supports More Spacecraft
	ARC	71/12/15
75/05/27		Testing of 1/3 Scale Model of Orbiter in a Wind Tunnel
Boeing	75/11/18	Report by Boeing on Space Shuttle Electrical Problems
DFRC	77/02/04	Announcement of Test Run Schedule for the Orbiter Enterprise
	77/02/18	First Piggyback Ride of the Enterprise
	77/02/22	Second Inert Captive Flight
	77/02/25	Third Inert Captive Flight

LOCATION INDEX

LOCATION	DATE	EVENT
DFRC	77/02/28	Fourth Inert Captive Flight
	77/03/02	Fifth Inert Captive Flight
	77/06/01	Announcement of SRB Parachute Test
	77/06/03	Delay of Orbiter's First Manned Captive Flight
	77/06/10	First Manned Test Flights of Enterprise Scheduled
	77/06/18	First Manned Flight of the Enterprise
	77/07/20	Announcement of Planned Third Manned Inert Flight of the Enterprise
	77/07/26	Third Manned Captive Flight
	77/09/24	Third Free Flight of the Enterprise
	77/10/12	Fourth Free Flight of the Enterprise
	77/10/26	Final Free Flight of Enterprise Successful
	77/11/15	One Set of Ferry Flight Tests of the Enterprise Begins
	77/12/09	Approach and Landing Tests Completed
EAFB	77/01/30	Enterprise Moved from Rockwell Plant to Edwards AFB
	77/08/12	First Free Flight of the Orbiter Enterprise
	77/09/13	Second Free Flight of the Orbiter Enterprise
	79/03/10	Orbiter Sheds Part of Heat Shield
	81/04/14	Columbia Returns to Earth After First Flight
FRC	70/10/12	Tests Indicate Shuttle Landing Could Be Made By Professional Pilots
GAO	71/08/03	Formal Protest Filed Against NASA by Pratt & Whitney
	74/01/09	Lockheed Asks GAO to Set Aside Thiokol's Selection for SRM Contract
Grumman	75/09/29	Space Shuttle Training Aircraft Test Flown
HOSC	80/10/08	"All Systems Test" Conducted on ET

LOCATION INDEX

LOCATION	DATE	EVENT
Huntsville	79/07/14	Ex-astronauts Pronounce the Shuttle Unsafe
JSC	73/03/15	JSC Issues RFPs to Build Space Shuttle Hydraulic Actuators
	73/05/02	Space Shuttle Development Wind Tunnel Data Contract Announced
	73/06/26	Selection of Engine to be Used on Orbiter
	76/02/25	Commander of First Free-flight Test Chosen
	76/03/24	New Spacesuit Design for Space Shuttle Travelers
	76/09/19	Relocation of Crew Training and Mission Control Activities
	77/02/28	Award of Contract to United Technologies Corp. for Space Suits
	77/06/20	Award of Contract with Rockwell for Modifications to the Orbiter
	78/03/14	JSC Questions the Supposed Lack of Interest in the Space Program
	78/03/17	Appointment of Flight Directors at JSC
	79/11/17	New Space Shuttle Director Named
	80/06/10	Simulated Launch Aborted and Relunched
	80/09/23	Mock Launch at JSC
	80/10/07	Launch Simulation Conducted
KSC	72/06/24	Survey of KSC Launch Site Announced
	74/04/01	Construction of Space Shuttle Runway Begins
	74/04/26	Award of Contract for Design Engineering Support Services
	75/01/28	New Director of KSC
	75/08/06	Announcement of Facilities Modification Contract to Alabama Firm
	75/11/00	KSC Vehicle Assembly Building Chosen for SRB Assembly
	77/04/14	Award of Contract to Rockwell for Orbiter

LOCATION INDEX

LOCATION	DATE	EVENT
KSC	77/04/14	Support
	77/06/17	Major Constructions at KSC for Launching Space Shuttle
	77/12/05	Completion of Open Sea Tests on Space Shuttle Retrieval Equipment
	78/04/07	Testing of Space Shuttle Landing System (MSBLS) Begun
	78/11/30	Experiment Pallet for Shuttle Flights Arrives from Europe
	79/03/24	Orbiter Arrives; Frosch Expects Another Delay
	79/07/11	SSME Arrives at Cape
	79/07/23	End of Enterprise Ground Tests
	79/08/08	New KSC Center Director Named
	79/11/26	Boosters Readied for First Flight
	79/12/20	Mock Space Shuttle Flight Successful
	80/01/08	Left-hand SRB Completes Stacking
	80/01/09	Astronauts Complete Mock Shuttle Launch and Flight
	80/01/10	Space Shuttle Mock Launch Halted SRB Stacking Completed
	80/01/11	Space Shuttle Mock Flight Successful
	80/01/17	Orbiter Integrated Tests (Mock Flights) Conclude
	80/01/28	Columbia Powered Up for Test
	80/04/09	Improved Tiles Pass Tests for Stresses
	80/07/14	Orbiter Integrated Tests Completed
	80/08/03	Installation of SSME's in Orbiter 102
	80/08/15	Successful Booster Tests at KSC
	80/11/03	ET Mated to SRB for STS-1
	80/11/24	Rollover Delayed

LOCATION INDEX

LOCATION	DATE	EVENT
KSC	80/11/24	Rollover Finally Completed
	80/11/26	Mating of Orbiter 102 to ET and SRB
	80/12/04	MSFC Engineers Support Shuttle Interface Test at KSC
	80/12/06	Shuttle Goes Through Simulated Launches
	80/12/15	Space Shuttle Flight Control Integrated Test Completed
	80/12/17	Shuttle Goes Through Third Simulated Launch
	80/12/19	SRB Thrust Vector Test
	80/12/29	Shuttle Mounted on Launch Pad 39A
	81/01/14	SRB Thrust Vector Test
	81/01/22	ET LH2 Tank Loaded for STS-1
	81/01/24	ET LO2 Tank Loaded
	81/01/26	SRB IEA Tested
	81/01/27	Leak Found in ET
		SRB Simulated Flight Conducted
	81/01/29	Ground Launch Sequencer Tested
	81/02/02	STS-1 Dress Rehearsal
	81/02/13	FRF Delayed
	81/02/20	Flight Readiness Firing of SSMEs in Orbiter 102
	81/03/08	Repairs Begun on Damaged Launch ET
	81/03/19	Columbia Passes Final Test; RIC Worker Dies
	81/04/01	Second Shuttle Technician Dies
	81/04/09	Tourists Gather at the Cape
	81/04/10	Shuttle Launch Delayed by Computer Problem
	81/04/12	Launch of Columbia
LaRC	78/02/23	Orbital Flight Test Manager Selected

LOCATION INDEX

<u>LOCATION</u>	<u>DATE</u>	<u>EVENT</u>
LeRC	70/07/15	Conference on Space Shuttle Technology Held at LeRC
	71/12/01	A&A Article by I. Irving Pinkel of LeRC Regarding Safety Problems
Long-Beach	73/02/10	Water Impact and Towing Tests of SRB
MAF	76/07/21	Assembly of First ET Begun
	76/07/29	Pneumatic Test Facility Completed at Michoud
	77/09/09	ET on the Way to NSTL for Testing
	79/06/25	First ET Ready for Flight
	80/12/02	Assembly of First Lightweight ET Begins
MMC	69/12/01	MMC Submits Final Report of ILRV Phase A Study
MSC	69/10/03	Shuttle Assistant for MSC Flight Crew Operations Directorate Chosen
	70/01/16	MSFC and MSC Agree on Division of Auxiliary Propulsion System Duties
	70/05/04	Scale model of Orbiter Drop Tested at Fort Hood
	70/05/19	MSC Shuttle Program Office Holds First Program Management Meeting
	70/05/27	Scale Model Dropped from a Helicopter as Part of Testing
	70/06/09	Scale Model Tested at White Sands
	70/06/15	SPACE SHUTTLE SYSTEM LEVEL II REQUIREMENTS Released
	70/07/00	MDAC Awarded Study Contracts for Auxiliary Propulsion System (APS)
	70/09/02	Award of Contract to MDAC and LTV Aerospace
	70/12/11	MSC Prepares Preliminary Draft of Space Shuttle Phase C/D SOW
	71/05/16	RFPs for Space Shuttle Surface Materials Issued
	71/07/01	Space Shuttle Preliminary Design Contracts Extended

LOCATION INDEX

LOCATION	DATE	EVENT
MSC	71/07/06	Extension of MDAC Contract for Space Shuttle APS Design Study
	71/12/09	McDonnell Douglas Presents Design Review at MSC
	72/02/04	Award of Contract to Conduct Orbiter Approach & Landing Simulations
	72/05/12	MDAC Orbiter Design Study Extended
		Space Shuttle Contract Technical Proposals Submitted to MSC
	72/07/10	Three Contract Awards Announced by MSC for Space Shuttle Work
	73/01/26	Announcement of Award of Contract to the Charles Stark Draper Lab
	73/08/27	MSC Officially Rededicated as JSC
MSFC	69/02/10	Management of Space Shuttle Conceptual Studies Contracts Announced
	70/01/16	MSFC and MSC Agree on Division of Auxiliary Propulsion System Duties
	70/02/05	Contracts Awarded for Shuttle Test Stand Modification Studies
	70/05/06	Proposals Submitted for a Nuclear Space Shuttle
	70/05/22	Three Contracts Awarded for Continuation of Nuclear Shuttle Definition
	70/05/26	MDAC and TRW in Final Negotiations for Shuttle Propulsion Contract
		Possible Uses of Space Tug
	70/06/07	Francis M. Stewart Presents Paper on Main Propulsion Requirements
	70/06/15	SPACE SHUTTLE SYSTEM LEVEL II REQUIREMENTS Released
	70/06/29	Space Shuttle Thermal Panel Repair Studies Assigned
	70/07/00	MDAC Awarded Study Contracts for Auxiliary Propulsion System (APS)

LOCATION INDEX

<u>LOCATION</u>	<u>DATE</u>	<u>EVENT</u>
MSFC	70/07/17	Firms Asked to Study Space Shuttle Vehicle Vents
	70/09/22-23	SSME Requirement Review
	70/09/30	McDonnell Douglas Makes First Phase B Quarterly Review at MSFC
	70/11/04	MSFC Seeks Bids on Space Shuttle Applications/Requirements Study
	70/11/19	Award of Study Contract to MDAC
	70/12/01	HEAO Meeting Held at MSFC SSME Design Review Meetings at MSFC
	70/12/11	MDAC Space Shuttle Briefing at MSFC
	70/12/15	MSFC Meeting to Review Studies of Chemical Interorbital Space Shuttle
	71/01/08	RAM Proposals Submitted
	71/01/13	Calibration Completed on New Wind Tunnel
	71/03/01	Announcement of SSME Testing Site (Mississippi Test Facility) Issuance of RFPs on Development of SSMEs
	71/03/15	Lockheed Submits Status Report on Alternate Space Shuttle Concepts Study
	71/04/06	Space Shuttle Technology Conference at MSFC
	71/04/20	Announcement of Prototype Heat Protection System Contract
	71/06/24	Announcement of Contract to Develop Turbo Pump for Space Shuttle APS
	71/06/28	Lockheed Submits Final Report of External Hydrogen Tank Studies
	71/06/29	Extension to Phase A Contract with Lockheed Extension to Phase B Contract with McDonnell Douglas
	71/06/30	McDonnell Douglas Releases SPACE SHUTTLE SYSTEM PHASE B FINAL REPORT

LOCATION INDEX

LOCATION	DATE	EVENT
MSFC	71/07/12	Announcement of Negotiations for Development and Delivery of SSMEs
	71/08/04	Space Shuttle Task Team Realigned
	71/09/01	Signing of SSME Design Contract with NAR Rocketdyne Division
	71/09/10	McDonnell Douglas Reduces Number of Configurations Under Consideration
	71/09/30	Conceptual Drawings of Booster Completed
	71/10/27	McDonnell Douglas Review at MSFC
	71/11/01	Feasibility Studies Contracts for Booster Awarded
	71/11/03	McDonnell Douglas Conducts OMSF Design Review
	71/11/10	Feasibility Study Contract of Space Shuttle Fly-away Airport Awarded
	71/11/15	Lockheed Submits Alternate Concepts Study Extension Final Report
		McDonnell Douglas Submits Final Report on Phase B Contract Extension
	71/11/19	MSFC Awards Booster Study Contract to Chrysler
	71/12/15	Lockheed Presents Review of Alternate Concepts Study Extension
		McDonnell Douglas Presents OMSF Review
	72/01/10	Establishment of MSFC Shuttle Program Office
	72/01/13	Selection of Companies to Analyze Possible Use of SRMs
	72/02/04	Announcement of NAR Rocketdyne SSME Contract Extension
	72/03/07	Extension of NAR Rocketdyne SSME Interim Contract
	72/03/15	Lockheed Publishes Phase B Space Shuttle Concepts Final Report
		McDonnell Douglas Submits Phase B System Final Report

LOCATION INDEX

LOCATION	DATE	EVENT
MSFC	72/05/16	MSFC Reaches Facilities Agreement With U.S. Army Corps of Engineers
	72/06/21	Proposals Submitted for SRB Recovery System
	72/08/15	Symposium on Composite Structural Materials for Space Shuttle Application
	72/08/16	SSME Prime Contractor Contract Signed
	72/09/06	Water-entry Simulation Test Series Announced
	72/09/07	MSFC Conducts ET and SRB Review
	72/11/21	Issuance of Requests for Space Tug Systems Proposals
	72/12/12	Second Review of ET and SRB Plans
	73/01/05	Reduction in Manned Space Flight Delays Shuttle
	73/01/26	Dr. Rocco A. Petrone becomes MSFC Director
	73/02/13	Establishment of Space Tug Task Team
	73/02/14	Selection of Firms to Negotiate Contracts for Space Tug Studies
	73/03/06	Third Quarterly NASA/Contractor Space Shuttle Review
	73/03/07	Preliminary Bioresearch Lab Simulator Delivered to MSFC
	73/05/31	Receipt of ET Proposals
	73/07/16	Requests for Proposals for Development of SRMs Issued
	73/08/03	Receipt of Proposals for Structural Test Data Acquisition System
	73/08/31	Receipt of SRM Development Proposals
	73/11/20	Drop Testing of SRB Model and SRB Recovery System
	74/02/13	Contract Awarded to Thiokol Chemical for Studies and Design
	74/03/05	Reorganization of NASA Headquarters and MSFC

LOCATION INDEX

LOCATION	DATE	EVENT
MSFC	74/03/23	Key Appointments in MSFC Space Shuttle Program Become Effective
	74/04/17	Award of Contract for Construction of SSME Test and Industrial Facilities
	74/05/15	RFPs Announced for Two Space Tug Studies
	74/06/17	Dr. William R. Lucas Becomes Director of MSFC
	74/06/18	Award of Contract to ITT for Two-way Optical Data Link
	74/07/26	MSFC Announced the Award of Six Contracts for Space Tug and IUS
	74/12/23	Award of Planning Study Contract to McDonnell Douglas
	75/01/00	Award of Contracts to Army Corps of Engineer
	75/01/17	Request for Proposals for IEAs for the SRB
	75/03/25	Captive Static Firing Mishap Involving Two SRBs
	75/04/01	MSFC Request to Sunstrand Corporation for APU Proposal
		Space Shuttle/Spacelab Connecting Tunnel Tested at MSFC
	75/04/10	Arrival of First Space Shuttle Ground Test Hardware at MSFC
	75/06/04	Announcement of Negotiations with Bendix for SRB Contract
	75/06/11	Award of ET Intertank Contract to Avco
	75/06/18	Award of Space Processing Equipment Contracts to TRW and GE
	75/07/01	Celebration of 15th Anniversary of MSFC
	75/07/09	Award of SRB Contracts
	75/07/11	Award of Contract for MDMs to Sperry Rand
	75/08/07	Announcement of Selection of United Technologies for BSM Negotiation
	75/08/19	Announcement of Award to MMC for PICs

LOCATION INDEX

LOCATION	DATE	EVENT
MSFC	75/09/02	SRB IEA Contract Awarded
	75/09/10	Completion of SRB Towing Tests
	75/09/30	Acoustic Tests on Space Shuttle Model Resume
	75/10/30	Modifications of Saturn V Test Stand Announced
	75/10/31	SRB TVC Electrohydraulic Servoactuators Contract
	75/12/10	Distribution of NASA Standard Parts List
		Space Station Concepts Reported
	76/01/08	MSFC Seeks Proposals on SRB Parachutes
	76/02/05	Subscale Thrust Chamber Assembly Test
	76/02/06	MSFC Test Program Aimed at Reducing Space Shuttle Launch Noise
	76/03/25	MSFC Issues RFPs for SRB Assembly
	76/04/09	Center Director's Quarterly Review Held
	76/04/16	Contracts for ET Test Towers at MSFC
	76/05/18	Agreement Signed to Conduct Tests on Parachute Recovery System for SRB
	76/05/24	SSME Controller Delivered to MSFC
	76/05/26	Testing Begins on SRM Bearing
	76/05/28	Martin Marietta Chosen to Produce SRB Decelerator Subsystem
		SSME Contract Extended
	76/06/03	MSFC Issues Contract for Signal Conditioners
	76/06/04	MSFC Issues Contract for Frequency Division Multiplexers
	76/07/00	MSFC Activities in July 1976
	76/07/15	Space Shuttle Study Contract Awarded
	76/07/16	First SSME Flight Configuration Nozzle Completed
	76/07/21	Announcement of Contract Award to Martin Marietta, Denver Division

LOCATION INDEX

LOCATION	DATE	EVENT
MSFC	76/07/29	MSFC Conducts Tank Tests
	76/08/13	Completion of Thiokol Facilities for Production of SRMs
	76/08/31	Selection of Three Firms for SRB Contract Negotiations
	76/09/02	Three Dummy SSMEs for Orbiter 101 Received by RIC
	76/09/03	Start of Hot-firing Tests of SRB Steering System
	76/09/27	Delivery of First SRB Production Case Segment to Thiokol
	76/09/30	Firing of a Developmental Test Engine for the Space Shuttle
	76/10/07	Contract Issued for SRB Location Aid Transmitters
		Modifications of the Space Shuttle Propulsion System Test Stand
	76/10/22	Completion of Straddle Carrier Transporter
	76/10/29	Modification of Saturn Facilities to ET Test Stand
		Selection of Bendix for Testing Equipment Contract Negotiations
	77/02/07	Use of Saturn Fabrication Tool to Solve ET Manufacturing Problem
	77/02/17	Amendment of MMC Contract to Provide Additional Manufacturing Facilities
	77/02/25	Shipment of the First Piece of ET Test Hardware
	77/03/07	Possibility of Using ET as a Permanent Space Platform Considered
	77/03/08	Amendment of Rocketdyne SSME Contract
	77/03/09	Request for Increase in NASA's FY78 Budget for ET Facilities
	77/03/11	Dynamic Testing of Parachutes to Recover SRBs
	77/03/16	Announcement of Award of Contract to Sperry

LOCATION INDEX

<u>LOCATION</u>	<u>DATE</u>	<u>EVENT</u>
MSFC	77/03/16	Support Services
	77/04/05	Award of Contract to T.H. Taylor Construction for MVGVT Test Platforms
	77/04/06	Award of Contract to Bryson Construction for Airfield Modification
	77/04/07	LOX Tank of ET Undergoes Hydrostatic Tests
	77/04/22	First Two SRB Integrated Electronic Assemblies Received
	77/05/04	Contract Modification Awarded to RIC Rocketdyne in SSME Program
	77/05/06	Announcement of Award to MMC for Construction of Test Stand
	77/05/10	Completion of Tests on Liquid Hydrogen Tank
	77/05/24	Modification of Saturn Test Stand Completed
	77/06/15	Test of SRB Recovery System Successful
	77/06/16	Wernher von Braun Dies
	77/06/17	Award of Contract for Moving the Enterprise During MSFC Testing
	77/06/24	Orbiter Simulator Arrives at NSTL for MPT
	77/07/18	Largest SRM Ever Developed Test Fired
	77/08/17	First Series of ET Tests Begun at MSFC
	77/08/18	SRB Painting Changed to Save Money
	77/08/30	Jettisoning Procedure Tested at MSFC
	77/10/14	Two MSFC Scientists Chosen for Further Screening
	77/11/05	Preparation of Electronic Simulations of Space Shuttle Orbital Missions
	77/11/11	Completion of ET Structural Tests
	77/12/23	Homemade Shuttle Makes Practice Run Through Marshall
	78/01/01	Navy Divers Support Space Shuttle Weightlessness Tests

LOCATION INDEX

LOCATION	DATE	EVENT
MSFC	78/01/25	SRB Parachute Recovery System to be Tested
	78/02/08	747 Orbiter Transport Arrives at Redstone
	78/02/24	ET Scheduled to Arrive at MSFC
	78/03/01	Completion of Tests Simulating Checkout of SRBs Components Arrive at MSFC for Vibration Tests
	78/03/08	Variety of SRB Ground Tests Managed by MSFC
	78/03/13	Enterprise Arrives at MSFC
	78/04/14	GVT Modification Completed
	78/04/21	First Vertical Ascent of the Orbiter Enterprise
	78/05/12	LOX Tank Buckles in Tanking Test
	78/05/23	Completion of SRB Parachute System Test
	78/05/24	First Major Test Firing of the Three SSMEs Successful
	78/05/30	Start of MVGVT Tests
	78/07/00	Richard Smith Appointed Deputy Associate Administrator for STS
	78/07/05	Electronic Simulators of SSME, SRB, and ET Pass Avionics Tests
	78/07/13	Reconfiguration of MVGVT Test Article from Boost to Launch
	78/07/20	Richard Smith Named Deputy Associate Administrator for STS
	78/07/26	Fifth SRB Drop Test
	78/08/02	Work Begun on Test Stand in Preparation for MVGVTs
	78/09/06	Orbiter Maneuvering Engine Test Firing
	78/09/12	Final SRB Airdrop Test Demonstrates Reusability of Boosters
	78/09/20	MVGVT Test Begun on Liftoff Configuration
	78/10/11	First Assembly of all Components of the Space

LOCATION INDEX

LOCATION	DATE	EVENT
MSEFC	78/10/11	Shuttle
	78/11/15	Delivery of Empty SRBs for MGVGT
	78/12/06	MVGVT Results Reveal Deviations
	79/01/30	Start of Burnout MGVGT
	79/02/23	MVGVT Completed at MSEFC
	79/02/26	Enterprise's Departure Set for 10 April
	79/03/08	Model Used for Space Shuttle Noise Test
		Preliminary Studies for Increasing Shuttle Thrusting Power Begins
	79/03/19	ET Leaves MSEFC Enroute to KSC
	79/03/28	Space Shuttle Model Static Test
	79/03/29	Space Shuttle Elements Safety & Quality Review Series Completed Today
	79/04/10	Enterprise Leaves MSEFC
	79/06/27	SSME Preliminary Flight Certification Completed
	79/07/16	Structural Testing of the LOX Tank of ET Gets Underway
	79/08/07	ET's "Soft Spots" Discovered
	79/08/17	Flippo and Lucas Meet Privately
	80/03/04	Space Shuttle Capacity for Polar Orbits to be Increased
	80/06/30	NASA Awards ET Contract to MMC
		NASA to Reduce ET Weight
	80/08/06	HOSC Reactivated
	80/08/14	MSEFC Announces No Launch Delay from SSME Test Accidents
	80/10/07	Liquid Propellant Booster Module Contract Awarded
	80/10/09	SRB Thermal Curtain Overpressure Panel Test Conducted

LOCATION INDEX

LOCATION	DATE	EVENT
MSFC	80/10/12	Extra Booster Proposed for Space Shuttle
	80/10/20	Contract for Shuttle-derived Launch Vehicles Study Awarded
		Modified SSME Nozzle Vibration Test Series Completed
	80/10/31	Explosion at MSFC Test Site
	80/11/07	MSFC Issues Contract to MMC
	81/01/25	Lightweight ET Contract Amended
MTF	74/02/08	Contract Issued for Modifications of Test Facilities at MTF
	74/06/14	Mississippi Test Facility's Name Changed
NAR	72/10/00	NAR Space Division Establishes Shuttle Development Baseline
	72/11/13	NAR Space Shuttle Program Requirement Review
NASA/HQ	69/01/31	NASA Awards Contracts for ILRV
	69/04/03	Thomas O. Paine Becomes NASA Administrator
	69/04/05	Space Shuttle Task Group (SSTG) Formed
	69/04/24	Space Shuttle Task Group Holds its First Meeting
	69/05/05	MSF Associate Administrator Conducts Contractor Briefing
	69/06/12	SSTG Completes SPACE SHUTTLE TASK GROUP REPORT
	69/06/20	Revised Phase ILRV Study Announced
	69/06/26	SSTG Releases an Additional Volume of its REPORT
	69/09/11	MSFC Given Responsibility for Shuttle Auxiliary Propulsion Development
	69/10/00	Two Decisions Made Concerning Shuttle Characteristics
	69/10/18	Joint Air Force/NASA Space Shuttle Design Criteria Review
69/11/10	Resignation of Dr. George E. Mueller Announced	

LOCATION INDEX

LOCATION	DATE	EVENT
NASA/HQ	69/12/10	Dr. George E. Mueller Resigns
	69/12/16	Establishment of the Phase B Source Evaluation Board
	70/01/12	Myers Replaces Mueller as Associate Administrator for MSF
	70/02/18	RFPs Issued for Definition and Planning of SSME Space Shuttle Phase B RFP Issued
	70/03/00	OMSF Shuttle Program Office Established
	70/03/19	TRW Delivers Proposal to NASA
	70/03/30	MDAC and NAR Submit Phase B Proposal to the SEB
	70/04/30	NASA Announces Selection of SSME Phase B Negotiation Contractors
	70/05/12	Selection of MDAC and NAR Space Division for Shuttle D&D Studies
	70/06/15	Negotiations With Three Firms for Phase A Studies Announced
	70/06/30	Confirmation of Headquarters' Intention to Expand Phase B Scope
	70/07/13	Space Shuttle System Ground Facilities RFPs
	70/09/15	Dr. Thomas Paine Resigns as NASA Administrator
	70/10/02	Award of Contract to Ralph M. Parsons Co.
	71/01/04	NASA Looking at Air Bases to Land Shuttle
	71/01/12	MDAC Submits Mass Properties Status Review of Phase B Study
	71/01/22	Reorganization of OMSF
	71/01/29	NASA Management Council Directs Changes in Phase B, Level 1 Requirements
	71/02/01	Announcement of First Horizontal and Orbital Flight Schedules
	71/03/03	Von Braun's Remarks in Budget Request for FY72
	71/04/00	Emphasis Shifted From Reusable Booster to

LOCATION INDEX

LOCATION	DATE	EVENT
NASA/HQ	71/04/00	Partially Expendable Booster
	71/04/01	NASA Adds New Task to Three Space Shuttle Study Contracts
	71/04/12	RAM Definition and Design Contract Awarded
	71/04/21	SSME Proposal Submitted
	71/04/27	Dr. James C. Fletcher Becomes Administrator
	71/05/22	Description of Future Space Shuttle Missions--Dale D. Myers
	71/06/04	Lockheed Submits Final Report on Alternate Space Shuttle Concepts Study
	71/06/10	NASA Announcement of OMSF Space Shuttle Program
	71/06/16	NASA Interest in "Phased Approach" to Space Shuttle Announced
	71/06/23	Reusable Chemical Propulsion Stage Study Contract Issued
	71/06/25	Rockwell Releases ORBITER EXTERNAL HYDROGEN TANK STUDY
	71/06/30	MDAC Releases EXTERNAL LH2 TANK STUDY FINAL REPORT
	71/07/06	Grumman Gives NASA ALTERNATE SPACE SHUTTLE CONCEPTS STUDY FINAL REPORT
	71/07/14	NAR Alternate Booster Contract Awarded TPS Contracts Awarded
	71/07/22	MDAC Submits Results of Phase A Booster Study
	71/08/12	Contracts Awarded to Textron, Bell Aerospace, and Rocketdyne
	71/10/07	Extensions to Space Shuttle Phase B Development Contracts
	71/12/22	Announcement of 1-month Extension of Rocketdyne Contract
	71/12/29	Administrators Meet to Decide on Space Shuttle Configuration

LOCATION INDEX

<u>LOCATION</u>	<u>DATE</u>	<u>EVENT</u>
NASA/HQ	71/12/30	Award of Contract to Aerospace Corporation
	72/01/00	Aerospace Corporation Submits Integrated Operations Analysis
	72/01/05	Donlan Officially Announces Decision to Build Space Shuttle
	72/01/31	Release of ECONOMIC ANALYSIS OF THE SPACE SHUTTLE SYSTEM by Mathematica
	72/02/03	First Space Shuttle Phase C/D Source Evaluation Board Convened
	72/03/17	Request for Proposals for Development of Orbiter & Integration Systems
	72/04/04	Award of SSME Development/Production Contract to Rocketdyne
	72/04/14	Launch and Landing Sites Chosen
	72/07/00	Cost Estimates and Scheduling for Space Shuttle Released
	72/07/01	Dr. Wernher von Braun Retires from NASA to Join Fairchild
	72/07/26	Orbiter Prime Contractor Negotiation
	72/08/07	NASA Debriefs Companies Not Chosen in Phase Competition
	72/08/09	Letter Contract with Rockwell Issued
	72/10/05	NASA Administrator Issues Report on NAR Selection
	72/10/31	NASA Decision on Subcontracting to Foreign Companies Announced
	72/12/15	Major Down-Sizing of the Space Shuttle Approved
	73/04/02	Request for ET Design, Development, and Production Proposals
	73/04/17	Orbiter Contract with Rockwell Announced
	73/08/16	Selection of MMC for ET Contract Negotiation
	73/09/01	Contract to MMC

LOCATION INDEX

LOCATION	DATE	EVENT
NASA/HQ	73/11/05	Return Payload Limit Increased
	73/11/20	Prime Contractor for SRMs Announced
	74/03/05	Reorganization of NASA Headquarters and MSFC
	74/04/08	McDonnell Douglas to Negotiate Space Shuttle Support Contract
	74/05/08	Yardley Named Associate Administrator for MSF
	74/05/17	IBM Selected to Design, Develop, Implement Computing System
	74/05/20	Announcement of Continuation of Thiokol Contract
	74/06/00	United Technology Center Submits Proposal for Backup
	74/06/17	Use of Boeing 747 Aircraft as Space Shuttle Ferry Announced
	74/06/27	Thiokol Awarded SRM Contract
	74/07/11	RIC Space Division Awarded Supplemental Orbiter Contract
	74/08/28	Award of ET Support Contract
	74/10/01	Formation of the Space Shuttle Operational Management Assessment Team
	74/10/18	Announcement of Space Shuttle Landing Site
	74/12/04	Space Shuttle Cost and Review Committee Recommended Program Changes
	75/02/23	Criteria for Selection of Astronauts Discussed
	75/02/24	Progress on Orbiter Reported to the Canadian Science Writers Association
	75/02/28	Orbiter 102 Preliminary Design Review
	75/04/09	Dr. Rocco Petrone Leaves NASA
	75/05/15	Award of SRM Contract to Thiokol, Wasatch Division
	75/06/30	Award of Contract to Air Products and Chemicals for LH2

LOCATION INDEX

LOCATION	DATE	EVENT
NASA/HQ	75/07/30	NASA Announces Selection of MMC for Support Contract
	75/08/22	Announcement of Negotiation with MDAC for SRB Structures
	75/09/28	Transfer of Programs to Different Offices
	75/10/01	Orbiter Supplemental Development Agreement Signed with RIC
	76/07/08	Call Issued for Space Shuttle Astronaut Candidates
	76/08/09	FY77 Budget's Space Share to Increase Only Slightly
	76/10/24	RIC Inspectors Find Fake Transistors
	76/12/17	Announcement of Selection of USBI as SRB Assembly Contractor
	77/05/01	Dr. James C. Fletcher Resigns as NASA Administrator
	77/05/16	NASA Had Chosen "Key Missions" for the Orbital Flight Tests
	77/06/28	Second Manned Inert Flight of the Enterprise Successful
	77/07/15	Applications for Space Shuttle Astronauts Received
	77/07/18	NASA and India Sign Memorandum of Understanding RFP on Payload Missions Integration
	77/07/29	Shuttle Astronauts to Report to JSC for Interviews and Exams
	77/08/01	Identification of About 40 Future Space Shuttle Payloads
	77/09/20	McDonnell Douglas Astronautics Awarded SSUS Contract
	78/01/16	Selection of Astronaut Candidates
	78/01/23	Scheduling of Skylab Rescue Shuttle Mission
	78/03/17	Selection of Crews to Begin Shuttle Flight

LOCATION INDEX

LOCATION	DATE	EVENT
NASA/HQ	78/03/17	Training
	78/04/06	SSME Test Failures Threaten to Delay Program
	78/05/31	Amendment to Rocketdyne SSME Contract
	78/08/22	Orbital Flight Tests Given a Designation System
	78/10/24	NASA Announces Date for First Manned Space Shuttle Flight
	78/12/05	Aerospace Safety Advisory Panel Recommends Changes: TVC and APU
	79/01/11	Delay Looming for Space Shuttle
	79/01/20	Launch Date Rescheduled
	79/01/25	NASA Announces Orbiter Names
	79/02/05	NASA Signs Contract with Rockwell for Two Orbiters
	79/02/16	SSME Testing Stopped by NASA
	79/05/01	Space Shuttle Cost to Hit \$8 Billion
	79/06/28	Launch Delayed
	79/09/07	Two Shuttle Test Flights To Be Cut
	79/09/18	Report Hits Delay of Space Shuttle Project
	79/10/16	Short Funds Cited as Top Drawback
	79/10/30	Space Shuttle Flights Booked
	79/11/05	L. Michael Weeks Joins NASA
	79/11/28	Space Shuttle Payload Gets Titan Boost
	80/03/31	Shuttle Untouched by NASA Budget Cuts
	80/05/13	NASA Announces Selection of NSTA to Monitor Student Shuttle Projects
	80/05/22	Delay of First Launch Announced
	80/07/31	First Space Shuttle Launch Date Announced
	80/08/27	Four Key Prelaunch Dates Announced

LOCATION INDEX

<u>LOCATION</u>	<u>DATE</u>	<u>EVENT</u>
NASA/HQ	81/01/16	NASA To Use Centaur as Upper Stage
	81/02/02	Launch Delayed Again
	81/03/18	Beggs Named NASA Administrator
	81/03/24	Launch Delayed Again
	81/04/01	Launch Moved to 10 April
NSTL	75/06/07	Rockwell Conducted Ignition Test of ISTB
	75/06/24	RIC Rocketdyne Test Fired Main Chamber of the SSME
	75/10/17	SSME Mainstage Test
	75/12/20	SSME 60 Second Duration Test
	76/01/08	SSME 0002 Arrives
	76/01/31	SSME Test 901-037 Conducted
	76/03/10	SSME Test 901-043 Conducted
	76/03/12	SSME Test 901-044 Conducted
	76/03/31	First Test Firing of the Second SSME
	76/04/07	Completion of Liquid Hydrogen Transfer Facility at NSTL
	76/07/30	SSME Test Fired for 650 Seconds
	77/03/17	NSTL's MPT Test Stand Turned Over to Rockwell
	77/03/18	SSME Tested at Rated Thrust Conditions
	77/12/13	Tanking Test Conducted on ET
	78/04/21	First MPTA-098 Static Firing
		SSME Ignition Test Completed
	78/05/19	Second MPTA-098 Static Firing
	78/06/15	Third MPTA-098 Static Firing
	78/07/07	First Shuttle MPT Series Completed
		Fourth MPTA-098 Static Firing

LOCATION INDEX

LOCATION	DATE	EVENT
NSTL	78/09/11	SSME Runs Full Duration
	78/09/20	Flight-Configured SSME Exceeds Certification Level
	78/10/30	SSME Passes Test
	78/12/15	Failure of an SSME Liquid Oxygen Heat Exchanger Studied
	79/03/17	SSME 2005 Delivered to NSTL
	79/05/04	Fifth MPTA-098 Static Firing
	79/05/10	Space Shuttle Main Propulsion Test (MPT) Begins Second Phase
	79/05/12	Columbia's First SSME Passes Flight Acceptance Test
	79/05/14	SSME Fire Delays Test
	79/06/12	Fifth MPTA-098 Static Firing SSME Tests Shut Down Again
	79/07/02	MPTA-098 Static Firing SSME Test Halted
	79/07/20	Last of Columbia's Three SSMEs Passes Flight Acceptance Test
	79/07/27	SSME Tests Delayed Until October 1979
	79/09/22	SSME 0105 Test Firing
	79/09/25	Second SSME 0105 Test Firing
	79/10/01	Third SSME 0105 Test Firing
	79/10/10	Space Shuttle Valve Fix Corrects SSME Problem SSME 0008 Test Firing SSME 2004 Test Firing
	79/10/12	Second SSME 0008 Firing Second SSME 2004 Test Firing
	79/10/24	MPTA-098 Static Firing Scrubbed

LOCATION INDEX

LOCATION	DATE	EVENT
NSTL	79/11/04	MPTA-098 Static Firing Failure
	79/11/24	SSME 0008 Fired
	79/12/17	MPTA-098 Static Firing
	80/01/09	SSME 2004 Firing
	80/01/15	SSME 2004 Firing
	80/02/08	Flight Configuration Engine Successfully Completes Test Series
	80/02/28	Successful Completion of Full Duration Test of MPTA-098
	80/03/13	SSME Passes First Full Power Test
	80/03/20	Eighth MPTA-098 Static Firing
	80/03/31	SSME Runs at 109% of Rated Power
	80/04/14	SSME Passes Second 109% Test
	80/04/16	MPTA-098 Static Firing
	80/04/19	SSME 2004 in Third Static Test
	80/05/30	MPTA-098 Static Firing Reconducted
	80/06/01	SSMEs on Orbiter 102 Undergo Series of Firings
	80/06/02	SSME Successful Retest
	80/06/16	Third SSME Successfully Retested
	80/07/12	Tenth Static Firing of MPTA-098
	80/07/23	SSME Damaged
	80/07/28	Standby Engine Fired
	80/07/30	Standby Engine Failure
	80/09/23	SSME 2008 Tested
	80/10/07	SSME 0009 Tested
	80/10/10	SSME 0009 Tested
	80/10/11	SSME 0008 Tested

LOCATION INDEX

LOCATION	DATE	EVENT
NSTL	80/10/13	SSME 0008 Tested
	80/10/15	SSME 0009 Tested
	80/10/22	SSME 0009 Test
	80/10/25	SSME 0009 Tested
	80/11/03	MPTA-098 Static Firing
	80/11/05	SSME 2008 Tested
	80/11/06	SSME 0009 Tested
	80/11/10	SSME 2008 Tested
	80/11/11	SSME 0009 Tested
	80/11/13	SSME 0009 Tested
	80/11/15	SSME 2008 Tested
	80/12/02	Final Cycle of SSME Preliminary Certification Tests Completed
		SSME 0009 Tested
	80/12/04	MPTA-098 Static Firing Retest
	80/12/05	SSME 2008 Tested
	80/12/12	SSME 2008 Tested
	80/12/15	SSME 0009 Tested
	80/12/30	SSME Certification Tests Completed
	81/01/17	Last Test Firing of MPTA Before Maiden Space Shuttle Flight
	81/01/21	SSME 0009 Tested
	81/01/23	SSME 0009 Tested
	81/01/26	SSME 0009 Tested
	81/01/31	Columbia's Spare SSME Begins Acceptance Testing
	81/02/09	Columbia's SSME Flight Spare Completes Acceptance Tests
	81/02/26	SSME 0006 Tested

LOCATION INDEX

LOCATION	DATE	EVENT
NSTL	81/02/28	SSME 0006 Tested
	81/03/03	SSME 0006 Tested
		Test of Repair Method for ET Debonded Insulation Completed
	81/03/05	SSME 0006 Tested
	81/03/06	SSME 0008 Tested
	81/03/09	ET for Second Launch Arrives at NSTL for Testing
OMSF	72/02/22	OMSF Design Review Examines Phase B Configurations
Palmdale-CA	79/03/08	Columbia Roll Out
Paris	73/08/14	Intergovernmental Agreement for Cooperation with Space Shuttle Signed
RIC	71/06/25	Rockwell Releases PHASE B FINAL REPORT
	73/03/29	Subcontracts Awarded for Orbiter Design and Fabrication
	73/04/16	Refinement of a Lightweight Version of the Space Shuttle
	73/06/18	RIC Space Division Announced Award of Subcontract to LTV Aerospace
	74/09/11	Lockheed to Subcontract Under Rockwell for Orbiter Testing
	75/03/24	Assembly of the First SSME Completed
	75/05/06	Award of SSME Subcontracts
	76/08/20	Orbiter 101 Ground Vibration/Proof Load Tests
	76/09/17	Orbiter 101 Rollout
	77/02/15	Orbiter MGVT and Taxi Tests
RIC/Downey	80/01/11	SSME 0007 Firing
	80/01/15	SSME 0007 Firing
	80/09/20	SSME 0007 Tested
	80/09/27	SSME 0007 Tested

LOCATION INDEX

LOCATION	DATE	EVENT
RIC/Downey	80/09/30	SSME 0007 Tested
	80/10/02	SSME 0007 Tested
	80/10/04	SSME 0007 Tested
	80/10/07	SSME 0007 Tested
	80/10/09	SSME 0007 Tested
	80/10/11	SSME 0007 Tested
	80/10/20	SSME 0007 Test
	80/11/06	SSME 0007 Tested
	80/11/08	SSME 0007 Tested
	80/11/11	SSME 0007 Tested
	80/11/13	SSME 0007 Tested
	80/11/15	SSME 0007 Tested
	80/12/01	SSME 0007 Tested
	80/12/06	SSME 0007 Tested
	80/12/30	SSME Certification Tests Completed
	81/01/22	SSME 0007 Tested
	81/02/09	SSME 0007 Tested
	81/02/23	SSME 0110 Tested
	81/02/25	SSME 0110 Tested
	81/03/02	SSME 0110 Tested
San-Antonio	72/04/12	NASA Space Shuttle Technology Conference
Space	81/04/13	Columbia's Second Day in Space
Switzerland	79/07/15	U.S. and U.S.S.R. Meet in Switzerland Regarding Space Shuttle
Texas-A&M	79/10/03	Texas A&M Negotiating SSME Contract
Thiokol	78/01/18	SRB Firing
	78/10/19	Third Test Firing of SRM

LOCATION INDEX

LOCATION	DATE	EVENT
Thiokol	79/02/17	Fourth SRB Firing
	79/06/13	First Qualification Firing of SRB (QM-1)
	79/09/27	SRB Test Brings Flight Near Reality
	80/02/13	Booster Test Said Successful
US-House	70/02/12	House Committee on Science and Astronautics Release Study
	72/01/25	Subcommittee Status Report to House Committee on Science/Astronautics
	72/04/20	Approval of FY73 NASA Authorization Bill
	73/03/09	SPACE SHUTTLE-SKYLAB, 1973: STATUS REPORT Submitted
	75/06/19	FY76 Appropriations Bill
	76/04/13	Supplemental Funding for NASA Authorized by the House
	79/02/12	Committee May Seek Fifth Orbiter
	79/05/10	Congressional Probe of Space Shuttle
	79/09/17	Phased Approach Cited for Overruns in Space Shuttle Costs
	80/03/21	Shuttle Survives First Budget Cut
	US-Senate	69/08/05
71/03/11		Confirmation of Dr. Fletcher as NASA Administrator
72/03/15		Announcement of Space Shuttle Configuration
73/10/30		Dr. Fletcher Testifies at Senate Aeronautical Committee Hearings
75/10/18		Rockwell Charged with "Entertaining" NASA Employees
78/03/01		National Academy of Sciences SSME Report Released
79/06/05		Senate Approves More Money for the Space Shuttle

LOCATION INDEX

LOCATION	DATE	EVENT
UTC	80/09/27	Space Shuttle Booster Recovery Ship Gets Commission
Washington	71/11/18	Number of Configuration Options Being Studied by NASA
	72/01/10	Events Leading to President's Endorsement of Space Shuttle Reported
	76/04/17	Safety of Space Shuttle Nuts and Screws Questioned
	76/05/07	Launch abort System Removed
	76/09/22	DOD Didn't Want Space Shuttle
	79/11/05	Rockwell Under Investigation
White-House	69/09/15	Presentation of THE POST-APOLLO SPACE PROGRAM Report to the President
	71/08/10	NASA Appropriation Bill Signed Into Law
	72/01/05	President Nixon Announces Decision to Proceed with Space Shuttle
	73/02/17	Nixon Signed into Law the Bill Changing MSC to JSC
	73/07/23	President Signs HR 7528 into Law (FY74 NASA Authorization Bill)
	74/06/22	Nixon Signed NASA's H.R. 13998 into Public Law 93-316
	76/09/08	President Ford Names the First Orbiter "Enterprise"
	79/11/14	President Carter Pledges Full Support for Space Shuttle
	79/11/30	Military Construction Bill Related to Shuttle Signed into Law
	81/02/19	Reagan Administration Supports Space Shuttle

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
Equipment	77/05/24	Modification of Saturn Test Stand Completed
ET	71/04/01	NASA Adds New Task to Three Space Shuttle Study Contracts
	71/06/25	Rockwell Releases ORBITER EXTERNAL HYDROGEN TANK STUDY
	71/06/28	Lockheed Submits Final Report of External Hydrogen Tank Studies
	71/06/30	MDAC Releases EXTERNAL LH2 TANK STUDY FINAL REPORT
	72/09/07	MSFC Conducts ET and SRB Review
	72/12/12	Second Review of ET and SRB Plans
	73/03/06	Third Quarterly NASA/Contractor Space Shuttle Review
	73/04/02	Request for ET Design, Development, and Production Proposals
	73/05/31	Receipt of ET Proposals
	73/08/16	Selection of MMC for ET Contract Negotiation
	73/09/01	Contract to MMC
	74/08/28	Award of ET Support Contract
	75/06/11	Award of ET Intertank Contract to Avco
	76/04/16	Contracts for ET Test Towers at MSFC
	76/07/15	Space Shuttle Study Contract Awarded
	76/07/21	Assembly of First ET Begun
	76/07/29	MSFC Conducts Tank Tests
		Pneumatic Test Facility Completed at Michoud
	76/10/22	Completion of Straddle Carrier Transporter
	76/10/29	Modification of Saturn Facilities to ET Test Stand
	77/02/07	Use of Saturn Fabrication Tool to Solve ET Manufacturing Problem

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
ET	77/02/17	Amendment of MMC Contract to Provide Additional Manufacturing Facilities
	77/02/25	Shipment of the First Piece of ET Test Hardware
	77/03/07	Possibility of Using ET as a Permanent Space Platform Considered
	77/03/09	Request for Increase in NASA's FY78 Budget for ET Facilities
	77/04/07	LOX Tank of ET Undergoes Hydrostatic Tests
	77/05/10	Completion of Tests on Liquid Hydrogen Tank
	77/08/17	First Series of ET Tests Begun at MSFC
	77/09/09	ET on the Way to NSTL for Testing
	77/11/11	Completion of ET Structural Tests
	77/12/13	Tanking Test Conducted on ET
	78/02/24	ET Scheduled to Arrive at MSFC
	78/04/21	First MPTA-098 Static Firing
	78/05/19	Second MPTA-098 Static Firing
	78/07/05	Electronic Simulators of SSME, SRB, and ET Pass Avionics Tests
	78/07/07	First Shuttle MPT Series Completed Fourth MPTA-098 Static Firing
	78/07/13	Reconfiguration of MVGVT Test Article from Boost to Launch
	79/01/30	Start of Burnout MVGVT
	79/03/19	ET Leaves MSFC Enroute to KSC
	79/05/04	Fifth MPTA-098 Static Firing
	79/06/12	Fifth MPTA-098 Static Firing
	79/06/25	First ET Ready for Flight
	79/07/02	MPTA-098 Static Firing
	79/07/16	Structural Testing of the LOX Tank of ET Gets

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
ET	79/07/16	Underway
	79/08/07	ET's "Soft Spots" Discovered
	79/10/24	MPTA-098 Static Firing Scrubbed
	79/11/04	MPTA-098 Static Firing Failure
	79/12/17	MPTA-098 Static Firing
	80/02/28	Successful Completion of Full Duration Test of MPTA-098
	80/03/20	Eighth MPTA-098 Static Firing
	80/04/16	MPTA-098 Static Firing
	80/05/30	MPTA-098 Static Firing Reconducted
	80/06/30	NASA Awards ET Contract to MMC NASA to Reduce ET Weight
	80/10/08	"All Systems Test" Conducted on ET
	80/11/03	ET Mated to SRB for STS-1 MPTA-098 Static Firing
	80/11/26	Mating of Orbiter 102 to ET and SRB
	80/12/02	Assembly of First Lightweight ET Begins
	80/12/04	MPTA-098 Static Firing Retest
	81/01/17	Last Test Firing of MPTA Before Maiden Space Shuttle Flight
	81/01/22	ET LH2 Tank Loaded for STS-1
	81/01/24	ET LO2 Tank Loaded
	81/01/25	Lightweight ET Contract Amended
	81/01/27	Leak Found in ET
	81/03/03	Test of Repair Method for ET Debonded Insulation Completed
	81/03/08	Repairs Begun on Damaged Launch ET
	81/03/09	ET for Second Launch Arrives at NSTL for Testing

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
Orbiter	70/05/04	Scale model of Orbiter Drop Tested at Fort Hood
	70/05/27	Scale Model Dropped from a Helicopter as Part of Testing
	70/06/09	Scale Model Tested at White Sands
	71/01/00	Straight Wing Versus Delta Wing Discussed by Air Force
	72/02/04	Award of Contract to Conduct Orbiter Approach & Landing Simulations
	72/03/17	Request for Proposals for Development of Orbiter & Integration Systems
	72/05/12	MDAC Orbiter Design Study Extended
	72/07/26	Orbiter Prime Contractor Negotiation
	72/08/09	Letter Contract with Rockwell Issued
	72/11/13	NAR Space Shuttle Program Requirement Review
	73/03/29	Subcontracts Awarded for Orbiter Design and Fabrication
	73/04/17	Orbiter Contract with Rockwell Announced
	73/06/18	RIC Space Division Announced Award of Subcontract to LTV Aerospace
	73/06/26	Selection of Engine to be Used on Orbiter
	73/11/05	Return Payload Limit Increased
	74/07/11	RIC Space Division Awarded Supplemental Orbiter Contract
	74/09/11	Lockheed to Subcontract Under Rockwell for Orbiter Testing
	74/11/19	Wind Tunnel Tests of 4% Scale Model of Orbiter
	75/02/24	Progress on Orbiter Reported to the Canadian Science Writers Association
	75/02/28	Orbiter 102 Preliminary Design Review
	75/05/27	Testing of 1/3 Scale Model of Orbiter in a Wind Tunnel

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
Orbiter	75/10/01	Orbiter Supplemental Development Agreement Signed with RIC
	76/08/20	Orbiter 101 Ground Vibration/Proof Load Tests
	76/09/08	President Ford Names the First Orbiter "Enterprise"
	76/09/17	Orbiter 101 Rollout
	77/01/30	Enterprise Moved from Rockwell Plant to Edwards AFB
	77/02/04	Announcement of Test Run Schedule for the Orbiter Enterprise
	77/02/15	Orbiter MGVT and Taxi Tests
	77/02/18	First Piggyback Ride of the Enterprise
	77/02/22	Second Inert Captive Flight
	77/02/25	Third Inert Captive Flight
	77/02/28	Fourth Inert Captive Flight
	77/03/02	Fifth Inert Captive Flight
	77/04/14	Award of Contract to Rockwell for Orbiter Support
	77/06/03	Delay of Orbiter's First Manned Captive Flight
	77/06/10	First Manned Test Flights of Enterprise Scheduled
	77/06/17	Award of Contract for Moving the Enterprise During MSFC Testing
	77/06/18	First Manned Flight of the Enterprise
	77/06/20	Award of Contract with Rockwell for Modifications to the Orbiter
	77/06/28	Second Manned Inert Flight of the Enterprise Successful
	77/07/20	Announcement of Planned Third Manned Inert Flight of the Enterprise
	77/08/12	First Free Flight of the Orbiter Enterprise

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
Orbiter	77/08/30	Jettisoning Procedure Tested at MSFC
	77/09/13	Second Free Flight of the Orbiter Enterprise
	77/09/24	Third Free Flight of the Enterprise
	77/10/12	Fourth Free Flight of the Enterprise
	77/10/26	Final Free Flight of Enterprise Successful
	77/11/15	One Set of Ferry Flight Tests of the Enterprise Begins
	77/12/09	Approach and Landing Tests Completed
	77/12/23	Homemade Shuttle Makes Practice Run Through Marshall
	78/02/23	Orbital Flight Test Manager Selected
	78/03/13	Enterprise Arrives at MSFC
	78/03/14	JSC Questions the Supposed Lack of Interest in the Space Program
	78/04/07	Testing of Space Shuttle Landing System (MSBLS) Begun
	78/04/21	First Vertical Ascent of the Orbiter Enterprise
	78/05/12	LOX Tank Buckles in Tanking Test
	78/07/13	Reconfiguration of MGVGT Test Article from Boost to Launch
	78/09/06	Orbiter Maneuvering Engine Test Firing
	79/01/25	NASA Announces Orbiter Names
	79/01/30	Start of Burnout MGVGT
	79/02/05	NASA Signs Contract with Rockwell for Two Orbiters
	79/02/12	Committee May Seek Fifth Orbiter
	79/02/26	Enterprise's Departure Set for 10 April
	79/03/08	Columbia Roll Out
	79/03/10	Orbiter Sheds Part of Heat Shield

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
Orbiter	79/03/24	Orbiter Arrives; Frosch Expects Another Delay
	79/04/10	Enterprise Leaves MSFC
	79/07/23	End of Enterprise Ground Tests
	80/01/11	Space Shuttle Mock Flight Successful
	80/04/09	Improved Tiles Pass Tests for Stresses
	80/07/14	Orbiter Integrated Tests Completed
	80/08/03	Installation of SSME's in Orbiter 102
	80/11/24	Rollover Delayed
		Rollover Finally Completed
	80/11/26	Mating of Orbiter 102 to ET and SRB
Payload	77/07/18	RFP on Payload Missions Integration
	81/01/16	NASA To Use Centaur as Upper Stage
Space-tug	70/05/26	Possible Uses of Space Tug
	72/11/21	Issuance of Requests for Space Tug Systems Proposals
	73/02/13	Establishment of Space Tug Task Team
	73/02/14	Selection of Firms to Negotiate Contracts for Space Tug Studies
	74/05/15	RFPs Announced for Two Space Tug Studies
	74/07/26	MSFC Announced the Award of Six Contracts for Space Tug and IUS
Spacelab	73/08/14	Intergovernmental Agreement for Cooperation with Space Shuttle Signed
SRB	71/07/22	MDAC Submits Results of Phase A Booster Study
	71/09/30	Conceptual Drawings of Booster Completed
	71/11/01	Feasibility Studies Contracts for Booster Awarded
	72/01/13	Selection of Companies to Analyze Possible Use of SRMs

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SRB	72/06/21	Proposals Submitted for SRB Recovery System
	72/09/06	Water-entry Simulation Test Series Announced
	72/09/07	MSFC Conducts ET and SRB Review
	72/12/12	Second Review of ET and SRB Plans
	73/02/10	Water Impact and Towing Tests of SRB
	73/03/06	Third Quarterly NASA/Contractor Space Shuttle Review
	73/07/16	Requests for Proposals for Development of SRMs Issued
	73/08/31	Receipt of SRM Development Proposals
	73/11/20	Drop Testing of SRB Model and SRB Recovery System
		Prime Contractor for SRMs Announced
	74/01/09	Lockheed Asks GAO to Set Aside Thiokol's Selection for SRM Contract
	74/02/13	Contract Awarded to Thiokol Chemical for Studies and Design
	74/05/20	Announcement of Continuation of Thiokol Contract
	74/06/00	United Technology Center Submits Proposal for Backup
	74/06/27	Thiokol Awarded SRM Contract
	75/01/17	Request for Proposals for IEAs for the SRB
	75/03/25	Captive Static Firing Mishap Involving Two SRBs
	75/04/01	MSFC Request to Sunstrand Corporation for APU Proposal
	75/05/15	Award of SRM Contract to Thiokol, Wasatch Division
	75/06/04	Announcement of Negotiations with Bendix for SRB Contract
	75/07/01	Study of External Burning to Increase Efficiency of SRMs

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SRB	75/07/01	Testing of Space Shuttle Propellants at AEDC
	75/07/09	Award of SRB Contracts
	75/07/11	Award of Contract for MDMs to Sperry Rand
	75/08/07	Announcement of Selection of United Technologies for BSM Negotiation
	75/08/19	Announcement of Award to MMC for PICs
	75/08/22	Announcement of Negotiation with MDAC for SRB Structures
	75/09/02	SRB IEA Contract Awarded
	75/09/10	Completion of SRB Towing Tests
	75/10/31	SRB TVC Electrohydraulic Servoactuators Contract
	75/11/00	KSC Vehicle Assembly Building Chosen for SRB Assembly
	76/01/08	MSFC Seeks Proposals on SRB Parachutes
	76/03/25	MSFC Issues RFPs for SRB Assembly
	76/05/18	Agreement Signed to Conduct Tests on Parachute Recovery System for SRB
	76/05/26	Testing Begins on SRM Bearing
	76/05/28	Martin Marietta Chosen to Produce SRB Decelerator Subsystem
	76/06/03	MSFC Issues Contract for Signal Conditioners
	76/06/04	MSFC Issues Contract for Frequency Division Multiplexers
	76/07/15	Space Shuttle Study Contract Awarded
	76/07/21	Announcement of Contract Award to Martin Marietta, Denver Division
	76/08/13	Completion of Thiokol Facilities for Production of SRMs
	76/08/31	Selection of Three Firms for SRB Contract Negotiations
	76/09/03	Start of Hot-firing Tests of SRB Steering System

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SRB	76/09/27	Delivery of First SRB Production Case Segment to Thiokol
	76/10/07	Contract Issued for SRB Location Aid Transmitters
	76/12/17	Announcement of Selection of USBI as SRB Assembly Contractor
	77/03/11	Dynamic Testing of Parachutes to Recover SRBs
	77/04/22	First Two SRB Integrated Electronic Assemblies Received
	77/06/01	Announcement of SRB Parachute Test
	77/06/15	Test of SRB Recovery System Successful
	77/07/18	Largest SRM Ever Developed Test Fired
	77/08/18	SRB Painting Changed to Save Money
	78/01/18	SRB Firing
	78/01/25	SRB Parachute Recovery System to be Tested
	78/03/01	Completion of Tests Simulating Checkout of SRBs
	78/03/08	Variety of SRB Ground Tests Managed by MSFC
	78/04/21	First MPTA-098 Static Firing
	78/05/19	Second MPTA-098 Static Firing
	78/05/23	Completion of SRB Parachute System Test
	78/07/05	Electronic Simulators of SSME, SRB, and ET Pass Avionics Tests
	78/07/07	Fourth MPTA-098 Static Firing
	78/07/13	Reconfiguration of MVGVT Test Article from Boost to Launch
	78/07/26	Fifth SRB Drop Test
	78/09/12	Final SRB Airdrop Test Demonstrates Reusability of Boosters
	78/10/19	Third Test Firing of SRM
	78/12/05	Aerospace Safety Advisory Panel Recommends

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SRB	78/12/05	Changes: TVC and APU
	79/01/30	Start of Burnout MVGVT
	79/02/17	Fourth SRB Firing
	79/03/08	Preliminary Studies for Increasing Shuttle Thrusting Power Begins
	79/05/04	Fifth MPTA-098 Static Firing
	79/06/12	Fifth MPTA-098 Static Firing
	79/06/13	First Qualification Firing of SRB (QM-1)
	79/07/02	MPTA-098 Static Firing
	79/09/27	SRB Test Brings Flight Near Reality
	79/10/24	MPTA-098 Static Firing Scrubbed
	79/11/04	MPTA-098 Static Firing Failure
	79/11/26	Boosters Readied for First Flight
	79/12/17	MPTA-098 Static Firing
	80/01/08	Left-hand SRB Completes Stacking
	80/01/10	SRB Stacking Completed
	80/02/13	Booster Test Said Successful
	80/02/28	Successful Completion of Full Duration Test of MPTA-098
	80/03/20	Eighth MPTA-098 Static Firing
	80/04/16	MPTA-098 Static Firing
	80/05/30	MPTA-098 Static Firing Reconducted
	80/08/15	Successful Booster Tests at KSC
	80/09/27	Space Shuttle Booster Recovery Ship Gets Commission
	80/10/09	SRB Thermal Curtain Overpressure Panel Test Conducted
	80/10/12	Extra Booster Proposed for Space Shuttle

COMPONENT INDEX

COMPONENT	DATE	EVENT	
SRB	80/11/03	ET Mated to SRB for STS-1 MPTA-098 Static Firing	
	80/11/26	Mating of Orbiter 102 to ET and SRB	
	80/12/04	MPTA-098 Static Firing Retest	
	80/12/19	SRB Thrust Vector Test	
	81/01/14	SRB Thrust Vector Test	
	81/01/17	Last Test Firing of MPTA Before Maiden Space Shuttle Flight	
	81/01/26	SRB IEA Tested	
	81/01/27	SRB Simulated Flight Conducted	
	SS	69/01/31	NASA Awards Contracts for ILRV
		69/02/10	Management of Space Shuttle Conceptual Studies Contracts Announced
69/04/05		Space Shuttle Task Group (SSTG) Formed	
69/04/24		Space Shuttle Task Group Holds its First Meeting	
69/05/05		MSF Associate Administrator Conducts Contractor Briefing	
69/06/12		SSTG Completes SPACE SHUTTLE TASK GROUP REPORT	
69/06/20		Revised Phase ILRV Study Announced	
69/06/26		SSTG Releases an Additional Volume of its REPORT	
69/09/11		MSFC Given Responsibility for Shuttle Auxiliary Propulsion Development	
69/10/00		Two Decisions Made Concerning Shuttle Characteristics	
69/10/18		Joint Air Force/NASA Space Shuttle Design Criteria Review	
69/12/01		MMC Submits Final Report of ILRV Phase A Study	
69/12/16		Establishment of the Phase B Source Evaluation Board	
70/01/00	Max Faget Announces Superiority of Two-stage		

COMPONENT INDEX

COMPONENT	DATE	EVENT
SS	70/01/00	Shuttle
	70/01/16	MSFC and MSC Agree on Division of Auxiliary Propulsion System Duties
	70/02/05	Contracts Awarded for Shuttle Test Stand Modification Studies
	70/02/18	Space Shuttle Phase B RFP Issued
	70/03/00	OMSF Shuttle Program Office Established
	70/03/19	TRW Delivers Proposal to NASA
	70/03/30	MDAC and NAR Submit Phase B Proposal to the SEB
	70/05/06	Proposals Submitted for a Nuclear Space Shuttle
	70/05/12	Selection of MDAC and NAR Space Division for Shuttle D&D Studies
	70/05/19	MSC Shuttle Program Office Holds First Program Management Meeting
	70/05/22	Three Contracts Awarded for Continuation of Nuclear Shuttle Definition
	70/05/26	MDAC and TRW in Final Negotiations for Shuttle Propulsion Contract
	70/06/07	Francis M. Stewart Presents Paper on Main Propulsion Requirements
	70/06/15	Negotiations With Three Firms for Phase A Studies Announced
		SPACE SHUTTLE SYSTEM LEVEL II REQUIREMENTS Released
	70/06/29	Space Shuttle Thermal Panel Repair Studies Assigned
	70/06/30	Confirmation of Headquarters' Intention to Expand Phase B Scope
	70/07/00	MDAC Awarded Study Contracts for Auxiliary Propulsion System (APS)
	70/07/13	Space Shuttle System Ground Facilities RFPs
	70/07/15	Conference on Space Shuttle Technology Held at LeRC

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	70/07/17	Firms Asked to Study Space Shuttle Vehicle Vents
	70/08/00	Expendable Booster Versus Reusable Booster Discussed by MDAC
	70/09/02	Award of Contract to MDAC and LTV Aerospace
	70/09/30	McDonnell Douglas Makes First Phase B Quarterly Review at MSFC
	70/10/02	Award of Contract to Ralph M. Parsons Co.
	70/10/12	Tests Indicate Shuttle Landing Could Be Made By Professional Pilots
	70/11/04	MSFC Seeks Bids on Space Shuttle Applications/Requirements Study
	70/11/19	Award of Study Contract to MDAC
	70/12/01	HEAO Meeting Held at MSFC
	70/12/11	MDAC Space Shuttle Briefing at MSFC MSC Prepares Preliminary Draft of Space Shuttle Phase C/D SOW
	70/12/15	MSFC Meeting to Review Studies of Chemical Interorbital Space Shuttle
	71/01/04	NASA Looking at Air Bases to Land Shuttle
	71/01/08	RAM Proposals Submitted
	71/01/12	MDAC Submits Mass Properties Status Review of Phase B Study
	71/01/13	Calibration Completed on New Wind Tunnel
	71/01/29	NASA Management Council Directs Changes in Phase B, Level 1 Requirements
	71/02/01	Announcement of First Horizontal and Orbital Flight Schedules
	71/03/03	Von Braun's Remarks in Budget Request for FY72
	71/03/15	AIAA Development, Testing, and Operations/NASA Technology Conference Lockheed Submits Status Report on Alternate Space Shuttle Concepts Study

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	71/04/00	Emphasis Shifted From Reusable Booster to Partially Expendable Booster
	71/04/06	Space Shuttle Technology Conference at MSFC
	71/04/20	Announcement of Prototype Heat Protection System Contract
	71/05/16	RFPs for Space Shuttle Surface Materials Issued
	71/05/22	Description of Future Space Shuttle Missions--Dale D. Myers
	71/06/04	Lockheed Submits Final Report on Alternate Space Shuttle Concepts Study
	71/06/16	NASA Interest in "Phased Approach" to Space Shuttle Announced
	71/06/23	Reusable Chemical Propulsion Stage Study Contract Issued
	71/06/24	Announcement of Contract to Develop Turbo Pump for Space Shuttle APS
	71/06/25	Rockwell Releases PHASE B FINAL REPORT
	71/06/29	Extension to Phase A Contract with Lockheed Extension to Phase B Contract with McDonnell Douglas
	71/06/30	McDonnell Douglas Releases SPACE SHUTTLE SYSTEM PHASE B FINAL REPORT
	71/07/01	Space Shuttle Preliminary Design Contracts Extended
	71/07/06	Extension of MDAC Contract for Space Shuttle APS Design Study Grumman Gives NASA ALTERNATE SPACE SHUTTLE CONCEPTS STUDY FINAL REPORT
	71/07/14	NAR Alternate Booster Contract Awarded TPS Contracts Awarded
	71/08/04	Space Shuttle Task Team Realigned
	71/08/12	Contracts Awarded to Textron, Bell Aerospace, and Rocketdyne

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	71/09/10	McDonnell Douglas Reduces Number of Configurations Under Consideration
	71/10/07	Extensions to Space Shuttle Phase B Development Contracts
	71/10/27	McDonnell Douglas Review at MSFC
	71/11/03	McDonnell Douglas Conducts OMSF Design Review
	71/11/15	Lockheed Submits Alternate Concepts Study Extension Final Report
		McDonnell Douglas Submits Final Report on Phase B Contract Extension
	71/11/18	Number of Configuration Options Being Studied by NASA
	71/11/19	MSFC Awards Booster Study Contract to Chrysler
	71/12/01	A&A Article by I. Irving Pinkel of LeRC Regarding Safety Problems
	71/12/09	McDonnell Douglas Presents Design Review at MSC
	71/12/15	Lockheed Presents Review of Alternate Concepts Study Extension
		McDonnell Douglas Presents OMSF Review
		Shuttle Aerothermodynamics Technology Conference at Ames
	71/12/29	Administrators Meet to Decide on Space Shuttle Configuration
	71/12/30	Award of Contract to Aerospace Corporation
	72/01/00	Aerospace Corporation Submits Integrated Operations Analysis
	72/01/05	Donlan Officially Announces Decision to Build Space Shuttle
		President Nixon Announces Decision to Proceed with Space Shuttle
	72/01/10	Establishment of MSFC Shuttle Program Office
		Events Leading to President's Endorsement of Space Shuttle Reported

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	72/01/25	Subcommittee Status Report to House Committee on Science/Astronautics
	72/01/31	Release of ECONOMIC ANALYSIS OF THE SPACE SHUTTLE SYSTEM by Mathematica
	72/02/03	First Space Shuttle Phase C/D Source Evaluation Board Convened
	72/02/22	OMSF Design Review Examines Phase B Configurations
	72/03/15	Announcement of Space Shuttle Configuration Lockheed Publishes Phase B Space Shuttle Concepts Final Report McDonnell Douglas Submits Phase B System Final Report
	72/04/12	NASA Space Shuttle Technology Conference
	72/04/14	Launch and Landing Sites Chosen
	72/04/20	Approval of FY73 NASA Authorization Bill
	72/05/12	Space Shuttle Contract Technical Proposals Submitted to MSC
	72/05/16	MSFC Reaches Facilities Agreement With U.S. Army Corps of Engineers
	72/06/24	Survey of KSC Launch Site Announced
	72/07/00	Cost Estimates and Scheduling for Space Shuttle Released
	72/08/07	NASA Debriefs Companies Not Chosen in Phase Competition
	72/08/15	Symposium on Composite Structural Materials for Space Shuttle Application
	72/10/00	NAR Space Division Establishes Shuttle Development Baseline
	72/10/05	NASA Administrator Issues Report on NAR Selection
	72/10/31	NASA Decision on Subcontracting to Foreign Companies Announced

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	72/12/15	Major Down-Sizing of the Space Shuttle Approved
	73/01/26	Announcement of Award of Contract to the Charles Stark Draper Lab
	73/03/07	Preliminary Bioresearch Lab Simulator Delivered to MSFC
	73/03/09	SPACE SHUTTLE-SKYLAB, 1973: STATUS REPORT Submitted
	73/03/15	JSC Issues RFPs to Build Space Shuttle Hydraulic Actuators
	73/04/16	Refinement of a Lightweight Version of the Space Shuttle
	73/05/02	Space Shuttle Development Wind Tunnel Data Contract Announced
	73/06/00	AIAA Article Emphasizes Desirability of Single Stage Shuttle
	73/08/03	Receipt of Proposals for Structural Test Data Acquisition System
	73/10/30	Dr. Fletcher Testifies at Senate Aeronautical Committee Hearings
	74/02/08	Contract Issued for Modifications of Test Facilities at MTF
	74/03/00	Single Stage Shuttles Exalted by AIAA Member
	74/03/23	Key Appointments in MSFC Space Shuttle Program Become Effective
	74/04/01	Construction of Space Shuttle Runway Begins
	74/04/08	McDonnell Douglas to Negotiate Space Shuttle Support Contract
	74/04/26	Award of Contract for Design Engineering Support Services
	74/05/17	IBM Selected to Design, Develop, Implement Computing System
	74/06/17	Use of Boeing 747 Aircraft as Space Shuttle Ferry Announced
	74/06/18	Award of Contract to ITT for Two-way Optical

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	74/06/18	Data Link
	74/10/01	Formation of the Space Shuttle Operational Management Assessment Team
	74/10/18	Announcement of Space Shuttle Landing Site
	74/12/04	Space Shuttle Cost and Review Committee Recommended Program Changes
	75/01/00	Award of Contracts to Army Corps of Engineer
	75/02/23	Criteria for Selection of Astronauts Discussed
	75/04/01	Space Shuttle/Spacelab Connecting Tunnel Tested at MSFC
	75/06/18	Award of Space Processing Equipment Contracts to TRW and GE
	75/06/24	Development of Testing Technique for Space Shuttle Spray-on Insulation
	75/09/17	Wind Tunnel Test of Space Shuttle Model at AEDC
	75/09/29	Space Shuttle Training Aircraft Test Flown
	75/09/30	Acoustic Tests on Space Shuttle Model Resume
	75/10/18	Rockwell Charged with "Entertaining" NASA Employees
	75/10/30	Modifications of Saturn V Test Stand Announced
	75/11/18	Report by Boeing on Space Shuttle Electrical Problems
	76/02/06	MSFC Test Program Aimed at Reducing Space Shuttle Launch Noise
	76/02/25	Commander of First Free-flight Test Chosen
	76/04/07	Completion of Liquid Hydrogen Transfer Facility at NSTL
	76/04/17	Safety of Space Shuttle Nuts and Screws Questioned
	76/05/07	Launch abort System Removed
	76/07/00	MSFC Activities in July 1976

COMPONENT INDEX

COMPONENT	DATE	EVENT
SS	76/07/08	Call Issued for Space Shuttle Astronaut Candidates
	76/09/19	Relocation of Crew Training and Mission Control Activities
	76/09/22	DOD Didn't Want Space Shuttle
	76/10/07	Modifications of the Space Shuttle Propulsion System Test Stand
	76/10/24	RIC Inspectors Find Fake Transistors
	76/10/29	Selection of Bendix for Testing Equipment Contract Negotiations
	77/02/28	Award of Contract to United Technologies Corp. for Space Suits
	77/03/16	Announcement of Award of Contract to Sperry Support Services
	77/03/17	NSTL's MPT Test Stand Turned Over to Rockwell
	77/04/05	Award of Contract to T.H. Taylor Construction for MGVGT Test Platforms
	77/04/06	Award of Contract to Bryson Construction for Airfield Modification
	77/05/06	Announcement of Award to MMC for Construction of Test Stand
	77/05/16	NASA Had Chosen "Key Missions" for the Orbital Flight Tests
	77/06/17	Major Constructions at KSC for Launching Space Shuttle
	77/06/24	Orbiter Simulator Arrives at NSTL for MPT
	77/07/15	Applications for Space Shuttle Astronauts Received
	77/07/26	Third Manned Captive Flight
	77/07/29	Shuttle Astronauts to Report to JSC for Interviews and Exams
	77/08/01	Identification of About 40 Future Space Shuttle Payloads

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	77/11/05	Preparation of Electronic Simulations of Space Shuttle Orbital Missions
	77/12/05	Completion of Open Sea Tests on Space Shuttle Retrieval Equipment
	78/01/01	Navy Divers Support Space Shuttle Weightlessness Tests
	78/01/23	Scheduling of Skylab Rescue Shuttle Mission
	78/02/08	747 Orbiter Transport Arrives at Redstone
	78/03/01	Components Arrive at MSFC for Vibration Tests
	78/03/17	Appointment of Flight Directors at JSC
	78/04/14	GVT Modification Completed
	78/05/30	Start of MVGVT Tests
	78/06/15	Third MPTA-098 Static Firing
	78/08/02	Work Begun on Test Stand in Preparation for MVGVTs
	78/08/22	Orbital Flight Tests Given a Designation System
	78/09/01	Space Shuttle Air Pressures and Loads Tested by USAF
	78/09/20	MVGVT Test Begun on Liftoff Configuration
	78/10/11	First Assembly of all Components of the Space Shuttle
	78/10/24	NASA Announces Date for First Manned Space Shuttle Flight
	78/11/15	Delivery of Empty SRBs for MVGVT
	78/12/06	MVGVT Results Reveal Deviations
	79/01/11	Delay Looming for Space Shuttle
	79/01/20	Launch Date Rescheduled
	79/02/23	MVGVT Completed at MSFC
	79/03/08	Model Used for Space Shuttle Noise Test
	79/03/28	Space Shuttle Model Static Test

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	79/03/29	Space Shuttle Elements Safety & Quality Review Series Completed Today
	79/05/01	Space Shuttle Cost to Hit \$8 Billion
	79/05/10	Congressional Probe of Space Shuttle
		Space Shuttle Main Propulsion Test (MPT) Begins Second Phase
	79/06/05	Senate Approves More Money for the Space Shuttle
	79/06/28	Launch Delayed
	79/07/14	Ex-astronauts Pronounce the Shuttle Unsafe
	79/07/15	U.S. and U.S.S.R. Meet in Switzerland Regarding Space Shuttle
	79/08/17	Flippo and Lucas Meet Privately
	79/09/07	Two Shuttle Test Flights To Be Cut
	79/09/18	Report Hits Delay of Space Shuttle Project
	79/10/16	Short Funds Cited as Top Drawback
	79/11/05	Rockwell Under Investigation
	79/11/14	President Carter Pledges Full Support for Space Shuttle
	79/11/28	Space Shuttle Payload Gets Titan Boost
	79/11/30	Military Construction Bill Related to Shuttle Signed into Law
	79/12/20	Mock Space Shuttle Flight Successful
	80/01/09	Astronauts Complete Mock Shuttle Launch and Flight
	80/01/10	Space Shuttle Mock Launch Halted
	80/01/17	Orbiter Integrated Tests (Mock Flights) Conclude
	80/01/28	Columbia Powered Up for Test
	80/03/04	Space Shuttle Capacity for Polar Orbits to be Increased
	80/03/21	Shuttle Survives First Budget Cut

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SS	80/03/31	Shuttle Untouched by NASA Budget Cuts
	80/05/22	Delay of First Launch Announced
	80/06/10	Simulated Launch Aborted and Relunched
	80/07/12	Tenth Static Firing of MPTA-098
	80/07/31	First Space Shuttle Launch Date Announced
	80/08/06	HOSC Reactivated
	80/08/14	MSFC Announces No Launch Delay from SSME Test Accidents
	80/08/27	Four Key Prelaunch Dates Announced
	80/09/23	Mock Launch at JSC
	80/10/07	Launch Simulation Conducted
		Liquid Propellant Booster Module Contract Awarded
	80/10/20	Contract for Shuttle-derived Launch Vehicles Study Awarded
	80/11/07	MSFC Issues Contract to MMC
	80/12/04	MSFC Engineers Support Shuttle Interface Test at KSC
	80/12/06	Shuttle Goes Through Simulated Launches
	80/12/15	Space Shuttle Flight Control Integrated Test Completed
	80/12/17	Shuttle Goes Through Third Simulated Launch
	80/12/29	Shuttle Mounted on Launch Pad 39A
	81/01/29	Ground Launch Sequencer Tested
	81/02/02	Launch Delayed Again
		STS-1 Dress Rehearsal
	81/02/13	FRF Delayed
	81/02/19	Reagan Administration Supports Space Shuttle
	81/03/19	Columbia Passes Final Test; RIC Worker Dies

COMPONENT INDEX

COMPONENT	DATE	EVENT	
SS	81/03/24	Launch Delayed Again	
	81/04/01	Launch Moved to 10 April	
		Second Shuttle Technician Dies	
	81/04/09	Tourists Gather at the Cape	
	81/04/10	Shuttle Launch Delayed by Computer Problem	
	81/04/12	Launch of Columbia	
	81/04/13	Columbia's Second Day in Space	
	81/04/14	Columbia Returns to Earth After First Flight	
	SSME	70/02/18	RFPs Issued for Definition and Planning of SSME
		70/04/30	NASA Announces Selection of SSME Phase B Negotiation Contractors
		70/09/22-23	SSME Requirement Review
		70/12/01	SSME Design Review Meetings at MSFC
		71/03/01	Announcement of SSME Testing Site (Mississippi Test Facility)
			Issuance of RFPs on Development of SSMEs
71/04/21		SSME Proposal Submitted	
71/07/12		Announcement of Negotiations for Development and Delivery of SSMEs	
71/08/03		Formal Protest Filed Against NASA by Pratt & Whitney	
71/09/01		Signing of SSME Design Contract with NAR Rocketdyne Division	
71/12/22	Announcement of 1-month Extension of Rocketdyne Contract		
72/02/04	Announcement of NAR Rocketdyne SSME Contract Extension		
72/03/07	Extension of NAR Rocketdyne SSME Interim Contract		
72/04/04	Award of SSME Development/Production Contract to Rocketdyne		

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SSME	72/07/10	Three Contract Awards Announced by MSC for Space Shuttle Work
	72/08/16	SSME Prime Contractor Contract Signed
	74/04/17	Award of Contract for Construction of SSME Test and Industrial Facilities
	75/03/24	Assembly of the First SSME Completed
	75/04/10	Arrival of First Space Shuttle Ground Test Hardware at MSFC
	75/05/06	Award of SSME Subcontracts
	75/06/07	Rockwell Conducted Ignition Test of ISTB
	75/06/24	RIC Rocketdyne Test Fired Main Chamber of the SSME
	75/06/30	Award of Contract to Air Products and Chemicals for LH2
	75/10/17	SSME Mainstage Test
	75/12/20	SSME 60 Second Duration Test
	76/01/08	SSME 0002 Arrives
	76/01/31	SSME Test 901-037 Conducted
	76/02/05	Subscale Thrust Chamber Assembly Test
	76/03/10	SSME Test 901-043 Conducted
	76/03/12	SSME Test 901-044 Conducted
	76/03/31	First Test Firing of the Second SSME
	76/04/09	Center Director's Quarterly Review Held
	76/05/24	SSME Controller Delivered to MSFC
	76/05/28	SSME Contract Extended
	76/07/16	First SSME Flight Configuration Nozzle Completed
	76/07/30	SSME Test Fired for 650 Seconds
	76/09/02	Three Dummy SSMEs for Orbiter 101 Received by RIC

COMPONENT INDEX

COMPONENT	DATE	EVENT
SSME	76/09/30	Firing of a Developmental Test Engine for the Space Shuttle
	77/03/08	Amendment of Rocketdyne SSME Contract
	77/03/18	SSME Tested at Rated Thrust Conditions
	77/05/04	Contract Modification Awarded to RIC Rocketdyne in SSME Program
	78/03/01	National Academy of Sciences SSME Report Released
	78/04/06	SSME Test Failures Threaten to Delay Program
	78/04/21	First MPTA-098 Static Firing SSME Ignition Test Completed
	78/05/19	Second MPTA-098 Static Firing
	78/05/24	First Major Test Firing of the Three SSMEs Successful
	78/05/31	Amendment to Rocketdyne SSME Contract
	78/07/05	Electronic Simulators of SSME, SRB, and ET Pass Avionics Tests
	78/07/07	First Shuttle MPT Series Completed Fourth MPTA-098 Static Firing
	78/09/11	SSME Runs Full Duration
	78/09/20	Flight-Configured SSME Exceeds Certification Level
	78/10/30	SSME Passes Test
	78/12/15	Failure of an SSME Liquid Oxygen Heat Exchanger Studied
	79/02/16	SSME Testing Stopped by NASA
	79/03/17	SSME 2005 Delivered to NSTL
	79/05/04	Fifth MPTA-098 Static Firing
	79/05/12	Columbia's First SSME Passes Flight Acceptance Test

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
SSME	79/05/14	SSME Fire Delays Test
	79/06/12	Fifth MPTA-098 Static Firing
		SSME Tests Shut Down Again
	79/06/27	SSME Preliminary Flight Certification Completed
	79/07/02	MPTA-098 Static Firing
		SSME Test Halted
	79/07/11	SSME Arrives at Cape
	79/07/20	Last of Columbia's Three SSMEs Passes Flight Acceptance Test
	79/07/27	SSME Tests Delayed Until October 1979
	79/09/17	Phased Approach Cited for Overruns in Space Shuttle Costs
	79/09/22	SSME 0105 Test Firing
	79/09/25	Second SSME 0105 Test Firing
	79/10/01	Third SSME 0105 Test Firing
	79/10/03	Texas A&M Negotiating SSME Contract
	79/10/10	Space Shuttle Valve Fix Corrects SSME Problem
		SSME 0008 Test Firing
		SSME 2004 Test Firing
	79/10/12	Second SSME 0008 Firing
		Second SSME 2004 Test Firing
	79/10/24	MPTA-098 Static Firing Scrubbed
	79/11/04	MPTA-098 Static Firing Failure
	79/11/24	SSME 0008 Fired
	79/12/17	MPTA-098 Static Firing
	80/01/09	SSME 2004 Firing
	80/01/11	SSME 0007 Firing

COMPONENT INDEX

COMPONENT	DATE	EVENT
SSME	80/01/15	SSME 0007 Firing
		SSME 2004 Firing
	80/02/08	Flight Configuration Engine Successfully Completes Test Series
	80/02/28	Successful Completion of Full Duration Test of MPTA-098
	80/03/13	SSME Passes First Full Power Test
	80/03/20	Eighth MPTA-098 Static Firing
	80/03/31	SSME Runs at 109% of Rated Power
	80/04/14	SSME Passes Second 109% Test
	80/04/16	MPTA-098 Static Firing
	80/04/19	SSME 2004 in Third Static Test
	80/05/30	MPTA-098 Static Firing Reconducted
	80/06/01	SSMEs on Orbiter 102 Undergo Series of Firings
	80/06/02	SSME Successful Retest
	80/06/16	Third SSME Successfully Retested
	80/07/23	SSME Damaged
	80/07/28	Standby Engine Fired
	80/07/30	Standby Engine Failure
	80/08/03	Installation of SSME's in Orbiter 102
	80/09/20	SSME 0007 Tested
	80/09/23	SSME 2008 Tested
	80/09/27	SSME 0007 Tested
	80/09/30	SSME 0007 Tested
	80/10/02	SSME 0007 Tested
	80/10/04	SSME 0007 Tested
	80/10/07	SSME 0007 Tested

COMPONENT INDEX

COMPONENT	DATE	EVENT
SSME	80/10/07	SSME 0009 Tested
	80/10/09	SSME 0007 Tested
	80/10/10	SSME 0009 Tested
	80/10/11	SSME 0007 Tested
		SSME 0008 Tested
	80/10/13	SSME 0008 Tested
	80/10/15	SSME 0009 Tested
	80/10/20	Modified SSME Nozzle Vibration Test Series Completed
		SSME 0007 Test
	80/10/22	SSME 0009 Test
	80/10/25	SSME 0009 Tested
	80/10/31	Explosion at MSFC Test Site
	80/11/03	MPTA-098 Static Firing
	80/11/05	SSME 2008 Tested
	80/11/06	SSME 0007 Tested
		SSME 0009 Tested
	80/11/08	SSME 0007 Tested
	80/11/10	SSME 2008 Tested
	80/11/11	SSME 0007 Tested
		SSME 0009 Tested
	80/11/13	SSME 0007 Tested
		SSME 0009 Tested
	80/11/15	SSME 0007 Tested
		SSME 2008 Tested
	80/12/01	SSME 0007 Tested
	80/12/02	Final Cycle of SSME Preliminary Certification

COMPONENT INDEX

COMPONENT	DATE	EVENT
SSME	80/12/02	Tests Completed SSME 0009 Tested
	80/12/04	MPTA-098 Static Firing Retest
	80/12/05	SSME 2008 Tested
	80/12/06	SSME 0007 Tested
	80/12/12	SSME 2008 Tested
	80/12/15	SSME 0009 Tested
	80/12/30	SSME Certification Tests Completed
	81/01/17	Last Test Firing of MPTA Before Maiden Space Shuttle Flight
	81/01/21	SSME 0009 Tested
	81/01/22	SSME 0007 Tested
	81/01/23	SSME 0009 Tested
	81/01/26	SSME 0009 Tested
	81/01/31	Columbia's Spare SSME Begins Acceptance Testing
	81/02/09	Columbia's SSME Flight Spare Completes Acceptance Tests SSME 0007 Tested
	81/02/20	Flight Readiness Firing of SSMEs in Orbiter 102
	81/02/23	SSME 0110 Tested
	81/02/25	SSME 0110 Tested
	81/02/26	SSME 0006 Tested
	81/02/28	SSME 0006 Tested
	81/03/02	SSME 0110 Tested
	81/03/03	SSME 0006 Tested
	81/03/05	SSME 0006 Tested
	81/03/06	SSME 0008 Tested

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
STS	69/04/03	Thomas O. Paine Becomes NASA Administrator
	69/08/05	Testimony by Paine, von Braun, and Mueller on Future of Space Program
	69/09/15	Presentation of THE POST-APOLLO SPACE PROGRAM Report to the President
	69/10/03	Shuttle Assistant for MSC Flight Crew Operations Directorate Chosen
	69/11/10	Resignation of Dr. George E. Mueller Announced
	69/12/10	Dr. George E. Mueller Resigns
	70/01/12	Myers Replaces Mueller as Associate Administrator for MSF
	70/02/12	House Committee on Science and Astronautics Release Study
	70/09/15	Dr. Thomas Paine Resigns as NASA Administrator
	71/01/22	Reorganization of OMSF
	71/03/11	Confirmation of Dr. Fletcher as NASA Administrator
	71/04/12	RAM Definition and Design Contract Awarded
	71/04/27	Dr. James C. Fletcher Becomes Administrator
	71/06/10	NASA Announcement of OMSF Space Shuttle Program
	71/08/10	NASA Appropriation Bill Signed Into Law
	71/11/10	Feasibility Study Contract of Space Shuttle Fly-away Airport Awarded
	72/07/01	Dr. Wernher von Braun Retires from NASA to Join Fairchild
	73/01/05	Reduction in Manned Space Flight Delays Shuttle
	73/01/26	Dr. Rocco A. Petrone becomes MSFC Director
	73/02/17	Nixon Signed into Law the Bill Changing MSC to JSC
	73/07/23	President Signs HR 7528 into Law (FY74 NASA Authorization Bill)

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
STS	73/08/27	MSC Officially Rededicated as JSC
	74/03/05	Reorganization of NASA Headquarters and MSFC
	74/05/08	Yardley Named Associate Administrator for MSF
	74/06/14	Mississippi Test Facility's Name Changed
	74/06/17	Dr. William R. Lucas Becomes Director of MSFC
	74/06/22	Nixon Signed NASA's H.R. 13998 into Public Law 93-316
	74/12/23	Award of Planning Study Contract to McDonnell Douglas
	75/01/28	New Director of KSC
	75/04/09	Dr. Rocco Petrone Leaves NASA
	75/06/19	FY76 Appropriations Bill
	75/07/01	Celebration of 15th Anniversary of MSFC
	75/07/30	NASA Announces Selection of MMC for Support Contract
	75/08/06	Announcement of Facilities Modification Contract to Alabama Firm
	75/09/28	Transfer of Programs to Different Offices
	75/12/10	Distribution of NASA Standard Parts List
		Space Station Concepts Reported
	76/03/24	New Spacesuit Design for Space Shuttle Travelers
	76/04/13	Supplemental Funding for NASA Authorized by the House
	76/08/09	FY77 Budget's Space Share to Increase Only Slightly
	77/05/01	Dr. James C. Fletcher Resigns as NASA Administrator
	77/06/16	Wernher von Braun Dies
	77/07/18	NASA and India Sign Memorandum of Understanding
	77/09/20	McDonnell Douglas Astronautics Awarded SSUS

COMPONENT INDEX

<u>COMPONENT</u>	<u>DATE</u>	<u>EVENT</u>
STS	77/09/20	Contract
	77/10/14	Two MSFC Scientists Chosen for Further Screening
	78/01/16	Selection of Astronaut Candidates
	78/03/17	Selection of Crews to Begin Shuttle Flight Training
	78/07/00	Richard Smith Appointed Deputy Associate Administrator for STS
	78/07/20	Richard Smith Named Deputy Associate Administrator for STS
	78/11/30	Experiment Pallet for Shuttle Flights Arrives from Europe
	79/02/06	Research Supports More Spacecraft
	79/08/08	New KSC Center Director Named
	79/10/30	Space Shuttle Flights Booked
	79/11/05	L. Michael Weeks Joins NASA
	79/11/17	New Space Shuttle Director Named
	80/05/13	NASA Announces Selection of NSTA to Monitor Student Shuttle Projects
	81/03/18	Beggs Named NASA Administrator
Test	77/05/24	Modification of Saturn Test Stand Completed

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO. MHR-15		2. GOVERNMENT ACCESSION NO.		3. RECIPIENT'S CATALOG NO.	
4. TITLE AND SUBTITLE Chronology: MSFC Space Shuttle Program Development, Assembly, and Testing Major Events (1969-April 1981)				5. REPORT DATE December 1988	
				6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S) Jessie E. Whalen and Sarah L. McKinley				8. PERFORMING ORGANIZATION REPORT #	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Management Services Incorporated P. O. Box 9034 Marshall Space Flight Center, AL 35812				10. WORK UNIT NO.	
				11. CONTRACT OR GRANT NO. NAS8-35900	
				13. TYPE OF REPORT & PERIOD COVERED Historical Report	
12. SPONSORING AGENCY NAME AND ADDRESS National Aeronautics and Space Administration Washington, D.C. 20546				14. SPONSORING AGENCY CODE	
15. SUPPLEMENTARY NOTES Prepared for Management Operations Office, Administrative Operations Office, Marshall Space Flight Center					
16. ABSTRACT This document contains listings of major events directly related to the Space Shuttle Program at the Marshall Space Flight Center. This information will provide the researcher with a means of following the chronological progression of the program.					
17. KEY WORDS Chronology MSFC History Space Shuttle			18. DISTRIBUTION STATEMENT Unclassified - Unlimited		
19. SECURITY CLASSIF. (of this report) Unclassified		20. SECURITY CLASSIF. (of this page) Unclassified		21. NO. OF PAGES 187	22. PRICE

End of Document