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**JOHN F. KENNEDY SPACE CENTER
UNIVERSITY OF CENTRAL FLORIDA**

KSC HISTORY PROJECT

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ABSTRACT

The project is a joint endeavor between Dr. Henry Dethloff and myself and is producing a number of products related to KSC history. This report is a summary of those projects. First, there is an overview monograph covering KSC history. Second, there is a chapter outline for an eventual book-length history. Third, there is monograph on safety at KSC. Finally, there is a web page and database dedicated to the KSC oral history project.

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Introduction

The Kennedy Space Center was created in 1962 to support the mission to the Moon proposed by President John F. Kennedy. For the next forty years, KSC served as the primary NASA launch facility and the only place in the western hemisphere where people have left the friendly confines of Earth's atmosphere for outer space. The Apollo program focused national attention on the center and brought it great accolades in 1969 when Neil Armstrong and Buzz Aldrin became the first men to walk on the Moon. More than one hundred shuttle missions have followed up this success and helped establish a permanent station in space. KSC has become the focus of NASA operations and public attention, to the average person KSC is NASA.

With the approach of the 40th anniversary in 2002, senior officials at KSC became concerned about preserving the center's history. KSC is the only NASA center without an official history. To rectify this situation, KSC has set aside money for a complete history of the center, a three-year project. Henry Dethloff and I, as Summer Fellows, were asked to prepare a number of preliminary projects not only for immediate dissemination but also for use in the eventual manuscript. These projects included, an article-length overview history of the center, an article-length overview of safety at KSC, a chapter outline of the history manuscript, a number of oral history interviews, and development of a database and web page to support the oral history work.

KSC Overview

Cape Canaveral, a protrusion of land from the Florida peninsula into the Atlantic first encountered by European explorers about 1500, became a milepost and a way station for the European discovery and exploration of the New World. Half a century later the Cape resumed that role as a milepost and a way station in the new age of Off-World planetary discoveries and the exploration of space. "Space," commented Kennedy Space Center's first center Director, Kurt Debus, perhaps reflecting on the common heritage of the New World explorers and those engaged in space and planetary exploration, "is not something new. It's part of the total environment, and we've been looking for the total environment ever since we looked out of caves at the stars." Ponce de Leon, who explored the area around Cape Canaveral in 1513, and multitudes of aerospace engineers, scientists, technicians, administrators, businesses, and their associates throughout the old world and the new, through NASA, the National Aeronautics and Space Administration, share a common bond in the continuing exploration of the total human environment.

First organized in December 1959 as the Launch Operations Directorate under the authority of the Marshall Space Flight Center located in Huntsville, Alabama, NASA's John F. Kennedy Space Center became the Launch Operations Center at Cape Canaveral on March 7, 1962. Twelve years earlier, in July 1950, an Army rocket team launched the first long-range missile, utilizing a refined version of a German World War II era V-2 rocket and a second-stage American WAC (Without Any Control)-Corporal rocket from Cape Canaveral. By the close of the decade American space vehicles, fired from the Cape, had taken the United States through the threshold of space. Just as Cape Canaveral was geographically situated to mark the way for the European exploration of the Americas, so the Kennedy Space Center is strategically situated

at the apex of NASA's programs for the exploration and development of space. Earth and Space sciences and aerospace technology, new ideas, and new products, are incubated in the intricately-meshed management teams of NASA Centers and Laboratories, and in the laboratories and offices of their contractors from industry and academia. Those ideas, the space flight vehicles and missions, the Earth and Space science laboratories, and their accompanying designs, innovations, and inventions are then "hatched" or tried and tested, as it were, under the management and direction of Kennedy Space Center. "Liftoff," at KSC is the most important and visible milestone in NASA space program development.

The history of Kennedy Space Center revisits the story of the inception of an American space program and the creation of NASA, and provides a new understanding of those remarkable events. It examines for the first time the unique relationship between KSC and the other NASA centers, and between KSC and other agencies engaged in space related activities, including the Department of Defense, the Army, the Air Force, and the Navy. This is the story, for the most part, of the men and women who managed the fantastically complicated send-offs of the launch vehicles and payloads designed and manufactured by American, and indeed, by the developing international aero-space, science, engineering, and space exploration community—and made them work.

It is the story of the Atlantic Missile Range and early experiments with long-range missiles, and of American successes and failures in early piloted flight. It is the history of Apollo and the lunar landings, now more than a quarter-century past. The narrative focuses heavily on the new, post-Apollo, Space Transportation System which, since the first flight of the Shuttle in April 1981, by the turn of the 21st Century had flown over 100 missions in space.

KSC too, is integral to the inception and development of the International Space Station, which promises to give not just Americans but the people of Earth a more permanent presence in space—that “extended environment of Earth”—well into the new millennium. KSC is NASA’s lead center for the acquisition and management of Expendable Launch Vehicle launch services, so essential to the maintenance of a continuing off-world presence.

And because Kennedy Space Center has been so omnipresent in the total story of NASA and space exploration, it, perhaps more so than other NASA Centers has been in the focus of the national (and global) media and press. That has created unique management problems, situations, and opportunities at KSC. A “public” presence has affected its history more so than that of other NASA facilities. External and public relations, a stress on safety, and on accommodating and educating the media, NASA’s “customers,” and the general public, have been an integral part of KSC’s history. As Cape Canaveral became a milepost, a way station in the European exploration of the New World five hundred years earlier, Cape Canaveral’s Kennedy Space Center has become within the past half-century our stepping stone, a literal launch pad, a way station in the exploration of space. Liftoff is the most critical event in the history of space exploration.

Chapter Outline

Chapter I. Cape Canaveral

- A. The Cape and the Exploration of the New World
- B. The Army and the Atlantic Missile Range
- C. Kurt Debus
- D. NASA/Huntsville and the Launch Operations Directorate

Chapter II. The Launch Operations Center

- A. Space Program Development and Needs
- B. Organizing the Launch Operations Center
- C. Center Design: Engineering/Community/Environment/Labor
 - 1. Land Acquisition/National Wildlife Refuge

- D. The Space Task Group: Projects Mercury and Gemini
 - 1. Mercury: Alan Shepard/John Glen
 - 1. Gemini: 4 and 7/6 missions
- Chapter III. The Apollo Lunar Program
 - A. President John F. Kennedy
 - B. Engineering for Lunar Launches
 - C. New Construction/Expansion
 - D. Designing for Lunar Launch
 - 1. Overview: KSC and Launch Complex 34, 37, and 39
- Chapter IV. The Flight of Apollo
 - A. Apollo Missions to Apollo 17 (1972): Overview
 - B. KSC and Center Interface/interactions
 - C. AS 204/ Safety and the Human Factor
 - D. Focus: KSC and Apollo 8, 10, 11, 17
- Chapter V. Post Apollo
 - A. Skylab
 - B. Apollo-Soyuz
 - C. Lee R. Scherer: Review/Redirection/KSC Plans and Programs
 - D. KSC And the Changing Dimensions of Space Exploration
- Chapter VI. A Space Transportation System
 - A. The Case for a Reusable Space Vehicle
 - 1. The ELV and the Shuttle
 - B. Shuttle Design and Development
 - C. Re-Engineering KSC's Launch facilities and operations
 - 1. Richard G. Smith
 - D. Conversion: Launch Complex 39
 - 1. VAB/Crawler/Mobile Launcher
 - 1. Orbiter Processing Facility/Shuttle Landing Facility
 - 2. Launch Processing System
- Chapter VII. The Shuttle Takes Flight
 - A. STS-1 through STS-51L: Overview of STS History to 1990
 - 1. Focus on: STS-1, STS-5, STS-41
 - B. Challenger (STS-51L)
 - C. In the Aftermath of Challenger
 - 1. Forrest S. McCartney/KSC Reforms and Reorganization
 - 2. The Safety Factor
 - D. A NASA Reappraisal/RIFs
 - 1. The KSC/Canaveral Community
- Chapter VIII. Living and Working in Space
 - A. Earth and Planetary Sciences and Investigations
 - 1. Payloads and Payload Specialists
 - B. STS-26>35
 - C. Hubble/Remote Manipulation Arm/Spacelab Module
 - D. The Growing Public Presence at KSC

1. KSC/NASA/Public Education and the Media
- Chapter IX. Countdown
- A. KSC/STS in the Nineties [Overview of 50 flights]
 - B. A Changing Dynamics in Space
 1. Capt. Robert L. Crippen, 1992-1995
 2. Jay Honeycutt, 1995-1997
 - C. Earth and Planetary Science Missions
 1. Focus on STS-41; STS-71
 - D. Mir Missions/ESA/Japan/Canada
- Chapter X. KSC and The Internationalization of Space Exploration
- A. Reflections on the Cold War
 - B. Global Communications Systems
 - C. MIR Missions
 - D. European Space Agency/ESA/Japan/Italy/Canada/China/The Americas
- Chapter XI. The International Space Station
- A. Conceptual Development
 - B. Political and Financial Evaluations
 - C. The Contractors' Payloads/Assembly
 - D. Mission Plans and Projections
- Chapter XII. . The Role of the Expendable Launch Vehicle
- A. A Brief History of ELV Since 1960
 - B. Reusable vs. Expendable
 1. Cost considerations and evaluations
 - C. NASA Plans and Projects for the ELV
 - D. KSC: Lead Center for ELV Launch and Payload Processing
- Chapter XIII. Into the 21st Century
- A. Space Spinoffs/Technology/Inventions
 1. KSC and Privatized/Commercial Space Initiatives
 - B. KSC and the Space Congresses
 - C. Roy Bridges/KSC Spaceport Master Plan
 1. STS 20th Anniversary/Reflections
 2. Space Experiment Research and Processing Laboratory
 - D. KSC: A Roadmap to Space Exploration

Oral History Program

Extensive interviews were conducted with the following people for the purpose of documenting their careers and experiences for posterity. This material will eventually be used for the full history text and for other projects.

- Bobby Bruckner: Manager of both payload processing and expendable launch vehicles.

- Terry Greenfield: KSC engineer since 1950s, present at Explorer 1 launch through present shuttle launches.
- Hugh Harris: Former Director of Public Affairs.
- Lisa Malone: First female voice of countdown at KSC.
- Forrest McCartney: KSC Center Director 1987-1991, responsible for the return to flight following Challenger accident.
- George Page: Test Director for Apollo 1 and Launch Director for STS-1.
- Alan Parrish: Arrived at KSC as an engineer in 1964, rose to Associate Director before retiring.
- Ike Rigell: KSC engineer since early 1960s, present for most major launches.
- Robert Sieck: Launch Director for the majority of STS missions, more than 70.
- Richard 'Dick' Smith: KSC Center Director 1979-1986, director during Challenger.
- Lee Solid: Former Vice-President and General Manager of Rockwell International's Florida operations.
- John Straiton: Oversaw development of International Space Station at KSC.
- Gene Thomas: Launch Director for Challenger, later the first Director of Safety.

Safety

The task of placing a human being into the vacuum of space is, by its very nature, a dangerous endeavor that demands extreme dedication to the question of safety. Even the simplest launch vehicle contains millions of parts and the failure of even one of these parts can have potentially catastrophic consequences. The cost of failure is measured not only dollars but also in the infinitely more valuable commodity of human life. Therefore the people who work on the United States' space program have developed a deep appreciation for the need to insure the utmost safety in every task.

Their constant vigilance has greatly reduced the number of accidents, making NASA one of the safest agencies in the United States government. Unfortunately, completely accident free operations remain an ongoing quest for NASA rather than an accomplished goal. Periodic accidents are a constant reminder of the danger inherent in space exploration and the ground

tasks necessary to support such an operation. This paper explores the development of safety policy and procedures at the Kennedy Space Center over the course of its forty-year history.

As the focal point of America's space program, the Kennedy Space Center has increased interest in insuring safety at the facility. The center is synonymous with NASA in the public mind and the national media focuses more coverage on KSC than any other NASA installation. Therefore accidents that occur at KSC attract more attention than similar incidences occurring at other NASA centers or private industry. The most remembered NASA failures, Apollo 1, Apollo 13, and Challenger, are irrevocably linked to KSC in the nation's collective memory.

Each of these accidents, and a number of lesser-known ones, has led directly to changes in policy, procedure, and even the bureaucratic structure at KSC. These changes have been designed to minimize the number and impact of accidents at KSC. While inherently reactive in nature, these accident-induced reviews are only part of the ongoing effort directed at making operations at KSC as safe as possible. Safety remains a prime consideration in all design work for both launch equipment and ground facilities. KSC requires all employees to undergo extensive safety training. Finally, in 1997 KSC Center Director Roy Bridges Jr. took the proactive step of committing the center's administration to the safety philosophy of the world's safest corporation, DuPont

Database & Web Page

Designed to complement the oral history program, both a database and web page are being developed by Dynex to in place by the end of the summer. The web page is based upon those at Ellis Island and will serve several purposes. First, it will allow KSC current employees and retirees, both NASA and contractor, to volunteer for the oral history project. They will enter

their pertinent biographical and contact information. Then they will be offered the opportunity to recount some of their favorite/most memorable moments at KSC. The Public Affairs Office will use selected accounts on the KSC web page to encourage more participation in the KSC history project.

Information collected via the web page or interviews will be entered into a database. The database will offer historians and other interested parties the ability to search oral history transcripts for pertinent information. It will also allow them to contact those individuals who have entered information on the web page but have yet to be interviewed. Searchable information include years worked, projects, positions, and contractor. Eventually this database may become a tremendous asset to historians working on a wide variety of topics at the center and throughout NASA.

Conclusion

As a total, this work lays the groundwork for a much larger project, a complete history of the forty years of launching space vehicles from the John F. Kennedy Space Center. From KSC, the first American orbited the Moon. From KSC, human beings first left our home and traveled to another celestial body. From KSC, more than one hundred flights of the Space Shuttle have lifted off. KSC exists as the focus of everything NASA does, yesterday, today, and for the foreseeable future. It is imperative that the history of this great place not be lost and thanks to the efforts of Center Director Roy Bridges, Director of External Relations JoAnn Morgan, and others there is now an ongoing project to preserve this past.