Human Space Flight

Legacy of the First Rocket to the Moon

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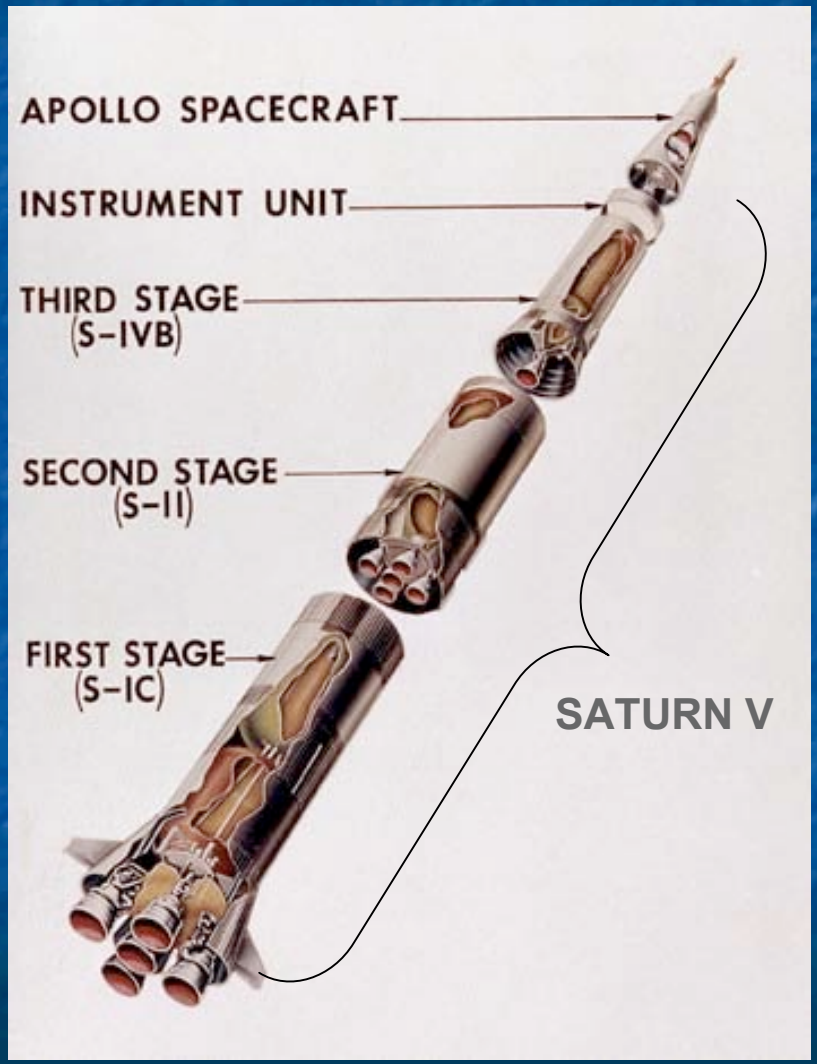
10/28/08

The Saturn V Vehicle



The Challenge:

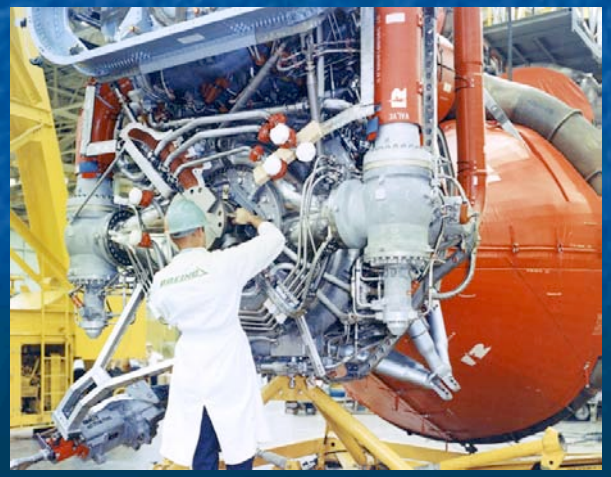
- Minimum to Lunar Transfer - 90,000 lbs (Final Capability 107, 000 lbs)
- Support a Lunar Landing by Man in < 8 years

The Answer:

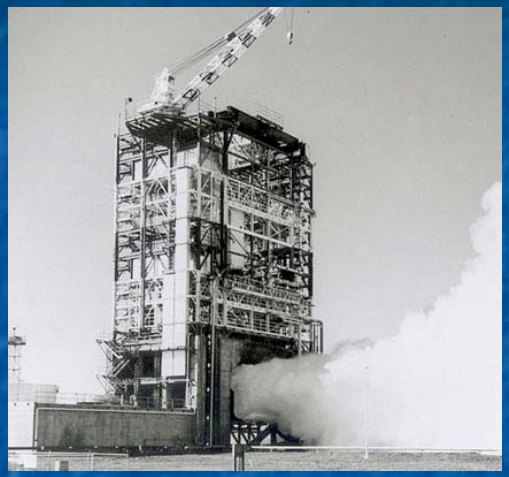
- Build the Team and capabilities that can make it happen.

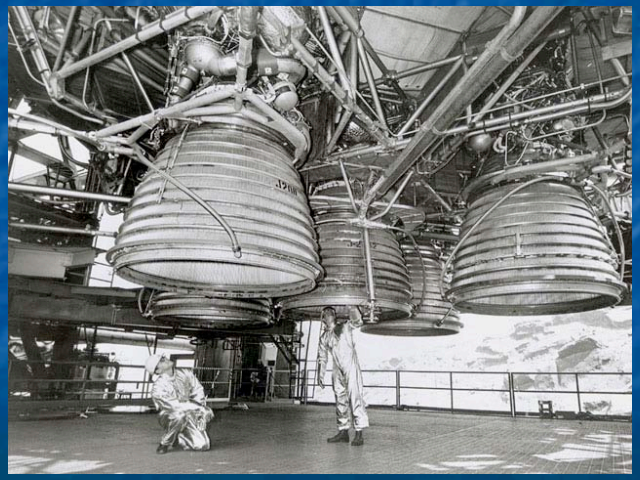
The Approach

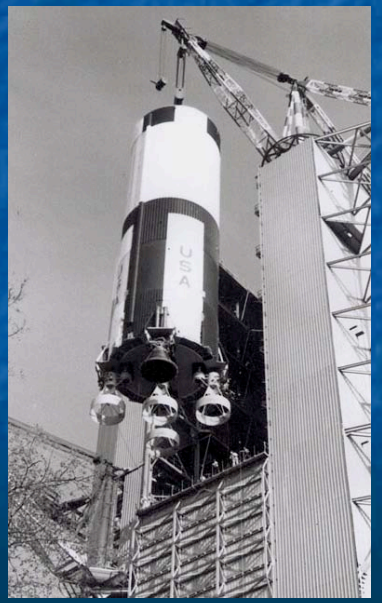
- Build on Existing Experience
- Use Available Technologies
- Establish Clear Organizational Responsibilities
- Engage a Capable Team
- Apply Highest Priority
- Demonstrate Hardware Capabilities to Avoid Risk



Facilities and Tests







Saturn S-IC Stage

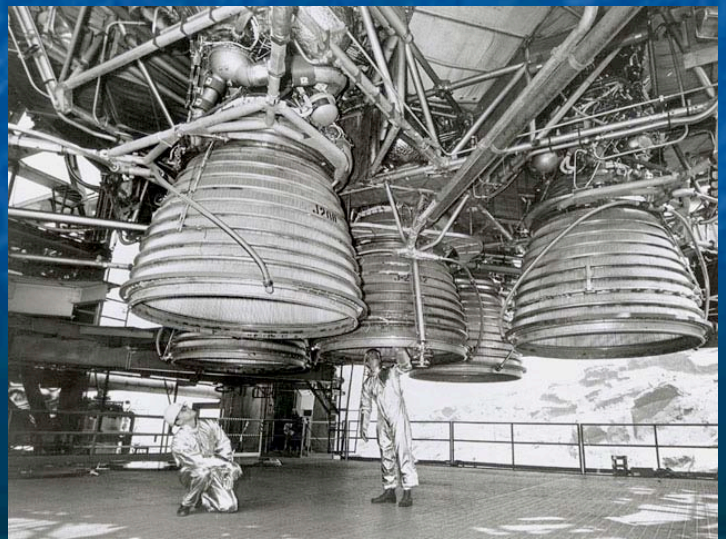
- MSFC In-house/Boeing Development
- 5 Rocketdyne F-1 LO2/RP-1 Engines
  - 7.6 M lbs Total Thrust
- 33 ft Diameter, 138 ft long
- Initial Stages Built at MSFC, others at Michoud Assembly Facility

- F-1 Engine Testing at Edwards AFB and at MSFC
- Stage Development and Initial Static Firing Tests at MSFC
- Production Acceptance Tests at Missisippi Test Facility

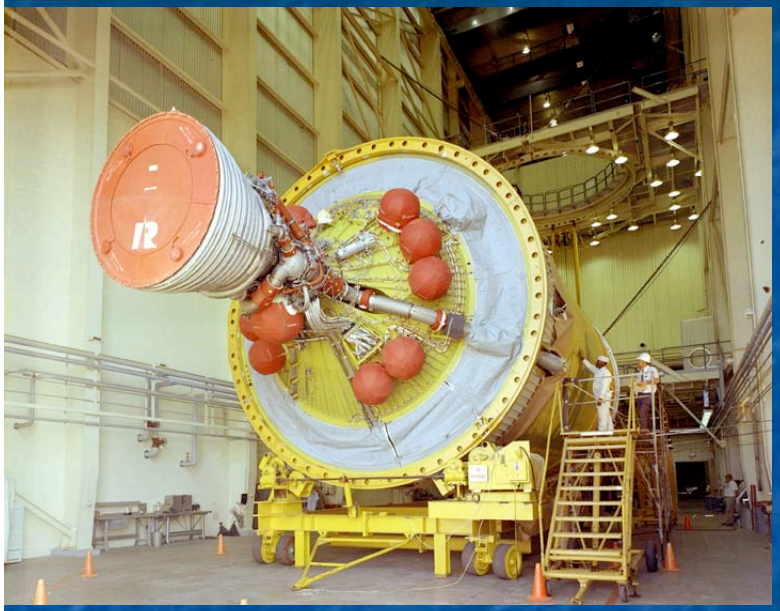
Saturn S-II Stage

- North American Aviation Development
- 5 Rocketdyne J-2 LO2/LH2 Engines Providing 1.15 M lbs Thrust
- 33 ft Diameter, 81 ft long
- Featured a Common Bulkhead
- Stages Fabricated and Assembled in California

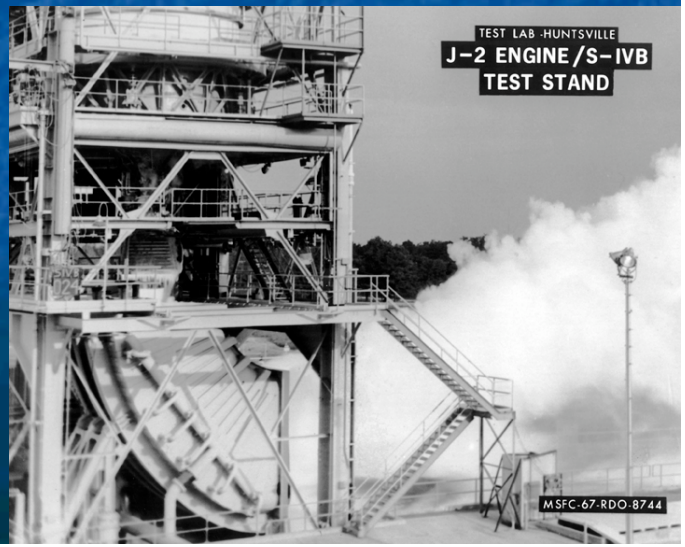
- Development tests at Santa Suzanna Test Facility
- All Systems and Acceptance Tests at Mississippi Test Facility



Saturn S-IVB Stage



- Douglas Aircraft Development, Based on the Saturn I S-IV Stage
- One Re-startable Rocketdyne J-2 LO2/LH2 Engine, Providing 230 K lbs Thrust
- 22 ft Diameter, 59 ft long
- Used a Common Bulkhead and Internal Insulation
- Stages Fabricated, Assembled and Tested in California
- Extensive Engine and Stage Testing also at MSFC



Objectives Accomplished

Apollo Saturn 501

SA - 501 (1967 - 6 years after go-ahead)

Unmanned Launch Vehicle Development (Fully successful)

SA - 502 (early 1968)

Unmanned Launch Vehicle Development (3 significant anomalies)

SA - 503 (late 1968)

First Lunar Trajectory Insertion with Full Crew (Fully successful)

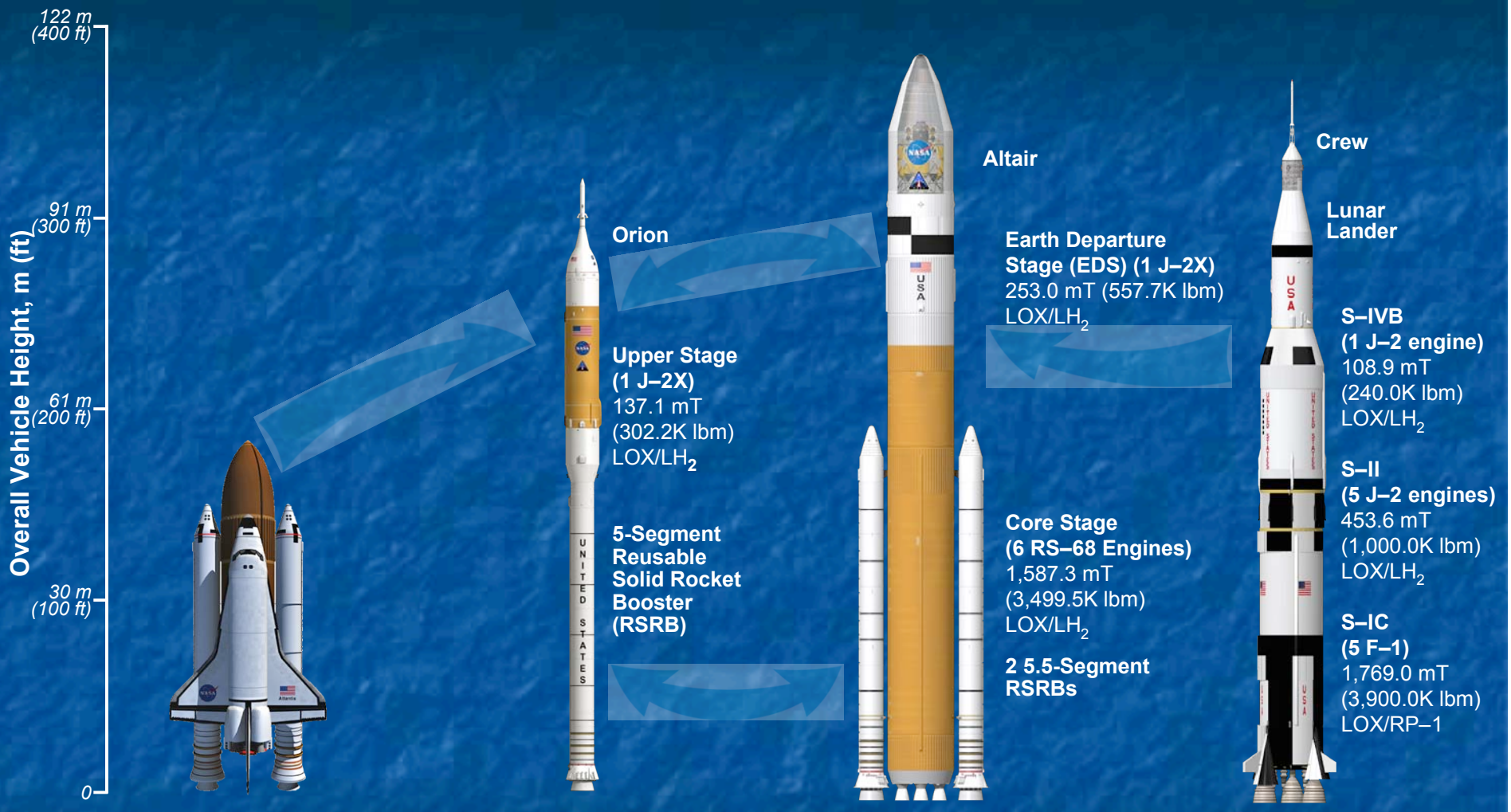
SA - 506 (July 1969 - 8 Years After Go-ahead)

Lunar Trajectory Insertion
First Humans on Moon

Perspective from the End Effectors

- Leadership and Management
- Communications
- Responsibility and Accountability
- Technical Excellence and Attention to Details
- Problems and Innovation

Building on the Foundation



Space Shuttle

Height: 56.1 m (184.2 ft)
Gross Liftoff Mass:
2,041.1 mT (4,500.0K lbm)
Payload Capability:
25.0 mT (55.1K lbm)
to Low Earth Orbit (LEO)

Ares I

Height: 99.1 m (325.0 ft)
Gross Liftoff Mass :
927.1 mT (2,044.0K lbm)
Payload Capability:
25.5 mT (56.2K lbm)
to LEO

Ares V

Height: 116.2 m (381.1 ft)
Gross Liftoff Mass :
3,704.5 mT (8,167.1K lbm)
Payload Capability:
71.1 mT (156.7K lbm) to TLI (with Ares I)
62.8 mT (138.5K lbm) to TLI
~187.7 mT (413.8K lbm) to LEO

Saturn V

Height: 110.9 m (364.0 ft)
Gross Liftoff Mass :
2,948.4 mT (6,500K lbm)
Payload Capability:
44.9 mT (99.0K lbm) to TLI
118.8 mT (262.0K lbm) to LEO