

# Return to Flight Rationale

Primary  
Hazard  
Control

*Elimination of Critical Debris*

Warning  
Devices

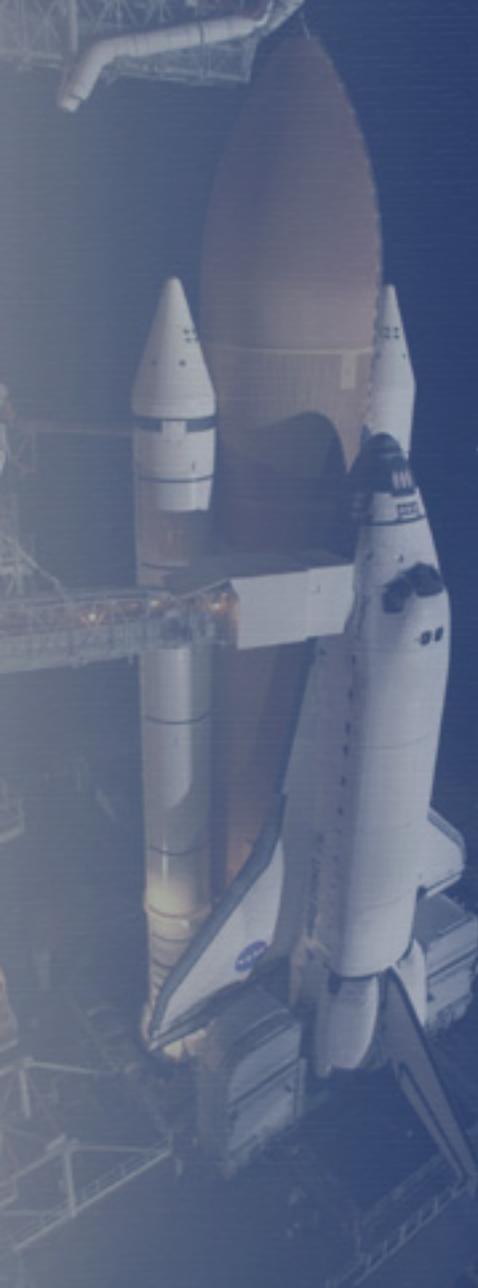
*Impact Detection  
During Ascent*

*On-Orbit Debris  
Impact/Damage Detection*

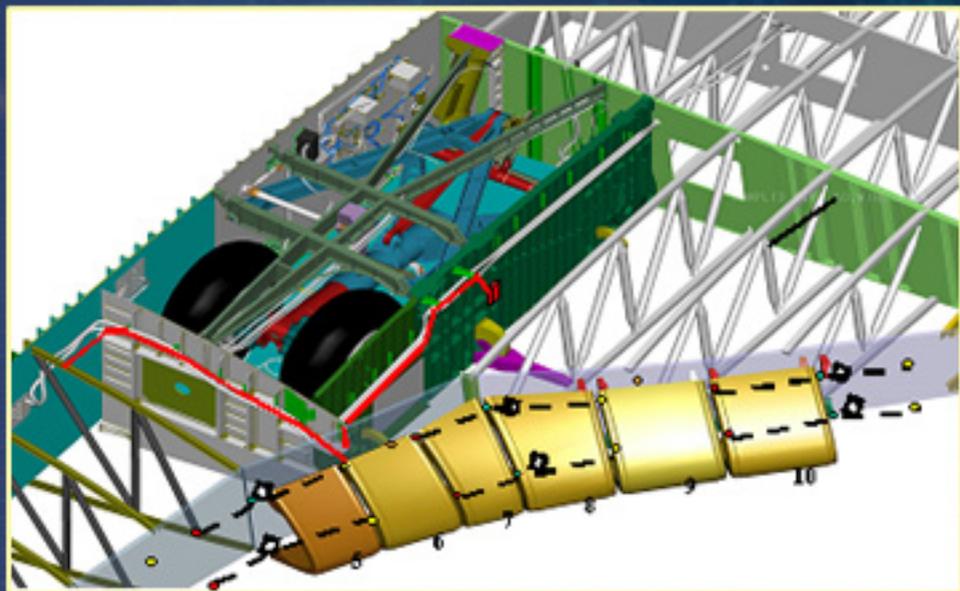
Special  
Procedures

*On-Orbit TPS Repair  
(Tile & RCC)*

*Crew Rescue*



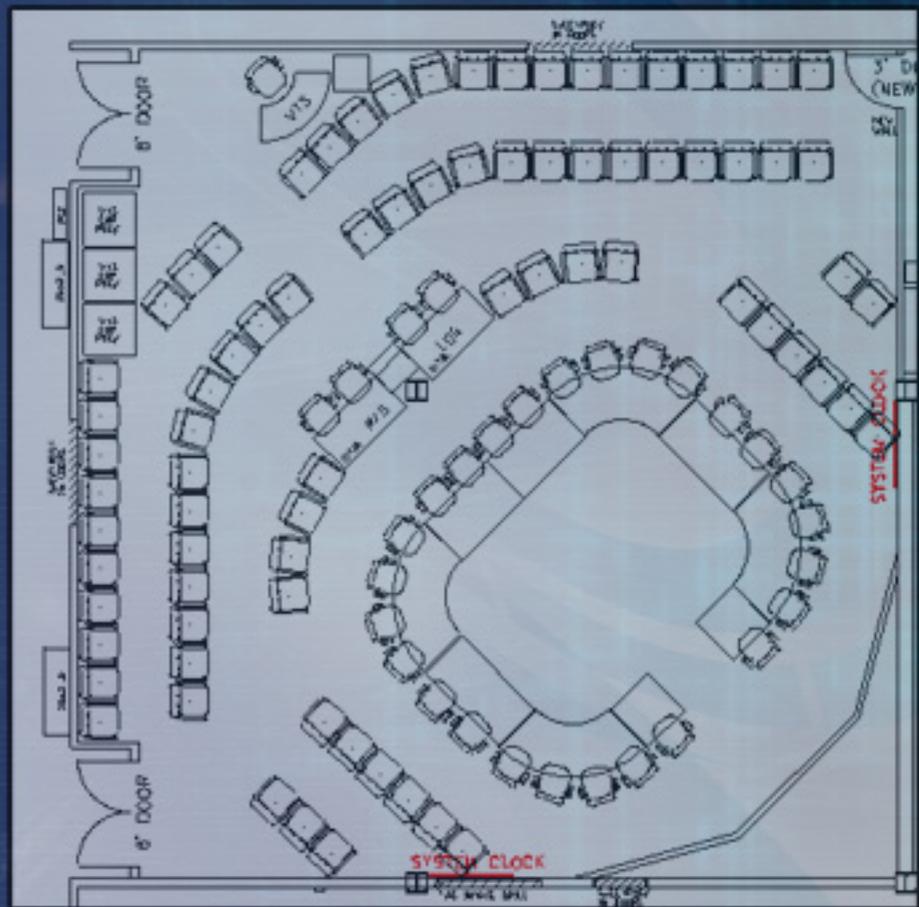
# Wing Leading Edge Instrumentation



*Additional means of impact detection:*

88 sensors per wing (66 accelerometer; 22 temperature)  
Information relayed to Shuttle flight deck for downlink

# MMT Command Center



# MMT POLLING ORDER

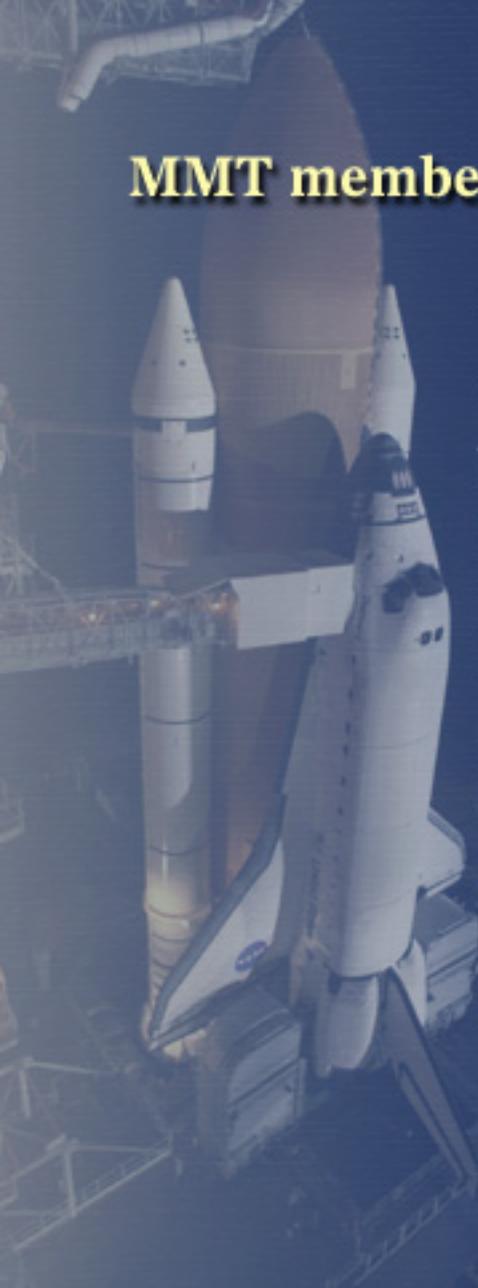
Launch only

- 1 LOCKHEED MARTIN MICHOU D SPACE SYSTEMS #
- 2 EXTERNAL TANK #
- 3 THIOKOL PROPULSION #
- 4 RSRM #
- 5 SRB #
- 6 ROCKETDYNE #
- 7 SSME #
- 8 MSFC ENGINEERING
- 9 DEPUTY PROGRAM MANAGER MSFC
- 10 HAMILTON SUNDSTRAND
- 11 EVA
- 12 UNITED SPACE ALLIANCE
- 13 JSC ENGINEERING
- 14 ORBITER
- 15 FLIGHT MANAGER

A photograph of the Space Shuttle Columbia on the Mobile Launcher Platform (MLP) being moved by a crawler-transporter. The MLP is a large, white, cylindrical structure that houses the shuttle and its external tank and boosters. The shuttle is oriented vertically, and the MLP is being transported on a set of tracks. The background is a dark, blue, grid-like pattern.

# **MMT POLLING ORDER**

- 16 MISSION OPERATIONS DIRECTORATE**
- 17 SPACE & LIFE SCIENCES**
- 18 FLIGHT CREW OPERATIONS**
- 19 ISS PROGRAM MANAGER**
- 20 DDMS**
- 21 LAUNCH INTEGRATION**
- 22 SHUTTLE PROCESSING**
- 23 DEPUTY PROGRAM MANAGER KSC**
- 24 SYSTEMS ENGINEERING AND INTEGRATION**
- 25 Flight Operations and Integration**
- 26 SS S&MA**
- 27 ADVISORY MEMBERS (as required)**
  - NESC, ITA KSC, ITA JSC, ITA MSFC,  
S&MA KSC, S&MA JSC, S&MA MSFC,  
KSC Spaceport Engineering & Technology**

A photograph of the Space Shuttle Challenger on the launch pad, viewed from a low angle. The shuttle is white with black and blue markings. The background is a dark blue grid pattern.

## **MMT membership training courses/reading materials:**

**Crew Resource Management**

**Critical Decision Making**

**Dupont Safety Course**

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*"Managing the unexpected: assuring high performance in an age of complexity"*

*"The vulnerable system: an analysis of the Tenerife air disaster"*

*"The Challenger launch decision"*

*"Creative decision making: using positive uncertainty"*

A photograph of the Space Shuttle Columbia on the launch pad, positioned vertically. The shuttle is white with black and blue markings. The background is a dark blue grid pattern.

## MMT membership training courses/reading materials:

Crew Resource Management

Critical Decision Making

Dupont Safety Course

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*"Judgments under stress"*

*"Why flip a coin: the art and science of good decisions"*

*"Aircraft safety: accident investigations, analyses, and applications"*

*"They called it pilot error: True stories behind general aviation accidents"*

# NASA's Implementation Plan for RTF

Revision 3.0 December 2004

Technical & Schedule Updates to All CAIB Recommendations

RTF Task Group has closed 5 of 15 to date

Space Shuttle Program closure to date:

- *7 of 14 CAIB Non-RTF Recommendations*
- *6 of 15 SSP "Raising the Bar" Actions*
- *24 of 27 CAIB Observations*

Milestones Reflect May 2005 launch date

## Status: 15 CAIB RTF Recommendations

CAIB #	Recommendation	Status
3.3-1	<i>TPS Nondestructive Inspection</i>	<i>Conditionally Closed 4/15/04</i>
4.2-3	<i>Closeout Inspection</i>	<i>Conditionally Closed 4/15/04</i>
6.3-2	<i>NASA/NIMA MOA</i>	<i>Conditionally Closed 4/15/04</i>
4.2-5	<i>Foreign Object Debris Program</i>	<i>Conditionally Closed 7/22/04</i>
10.3-1	<i>Digitize Closeout Photographs</i>	<i>Conditionally Closed 7/22/04</i>

# Status: 15 CAIB RTF Recommendations

## CAIB # SLATED FOR DECEMBER 2004 PLENARY CONSIDERATION

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- 4.2-1 *SRB Bolt Catcher*
- 3.3-2 *Orbiter Hardening (Part 1 – Initiate Program)*
- 3.4-1 *Ground-Based Imagery*
- 3.4-2 *ET Separation Imagery*
- 9.1-1 *Plan for Organizational Changes*  
*(R7.5-1 – Independent Technical Eng. Authority)*

## Status: 15 CAIB RTF Recommendations

### CAIB # SUBMITTED TO RTF TASK GROUP FOR ASSESSMENT

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- 3.4-3 *On-Vehicle Ascent Imagery*
- 6.2-1 *Scheduling and Resources*
- 6.3-1 *MMT Improvements*

### TO BE SUBMITTED TO RTF TASK GROUP

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- 3.2-1 *ET TPS Modifications*
- 6.4-1 *TPS On-Orbit Inspect and Repair*

## 10 RTF “Raising the Bar” Initiatives

SSP #	Description	Scheduled Closure Status
2	<i>Public Risk of Overflight</i>	<i>December 2004</i>
3	<i>Safe Haven (CSCS)</i>	<i>December 2004</i>
4	<i>Acceptable Risk Hazards</i>	<i>April 2005</i>
5	<i>Critical Debris Sources</i>	<i>February 2005</i>
6	<i>Waivers, Deviations, Exceptions</i>	<i>February 2005</i>
7	<i>NASA Working Group Findings</i>	<i>Closed in May 2004</i>
8	<i>Certification of Flight Readiness</i>	<i>Closed in July 2004</i>
9	<i>Failure Mode and Effects Analysis</i>	<i>April 2005</i>
14	<i>Critical Debris Size</i>	<i>April 2005</i>
15	<i>Problem Tracking, Inflight, Anomalies and Anomaly Resolution</i>	<i>Closed in August 2004</i>