SPACE SHUTTLE PROGRAM
Space Shuttle Program Integration
NASA Johnson Space Center, Houston, Texas

STS-108 Flight Readiness Review

November 15, 2001

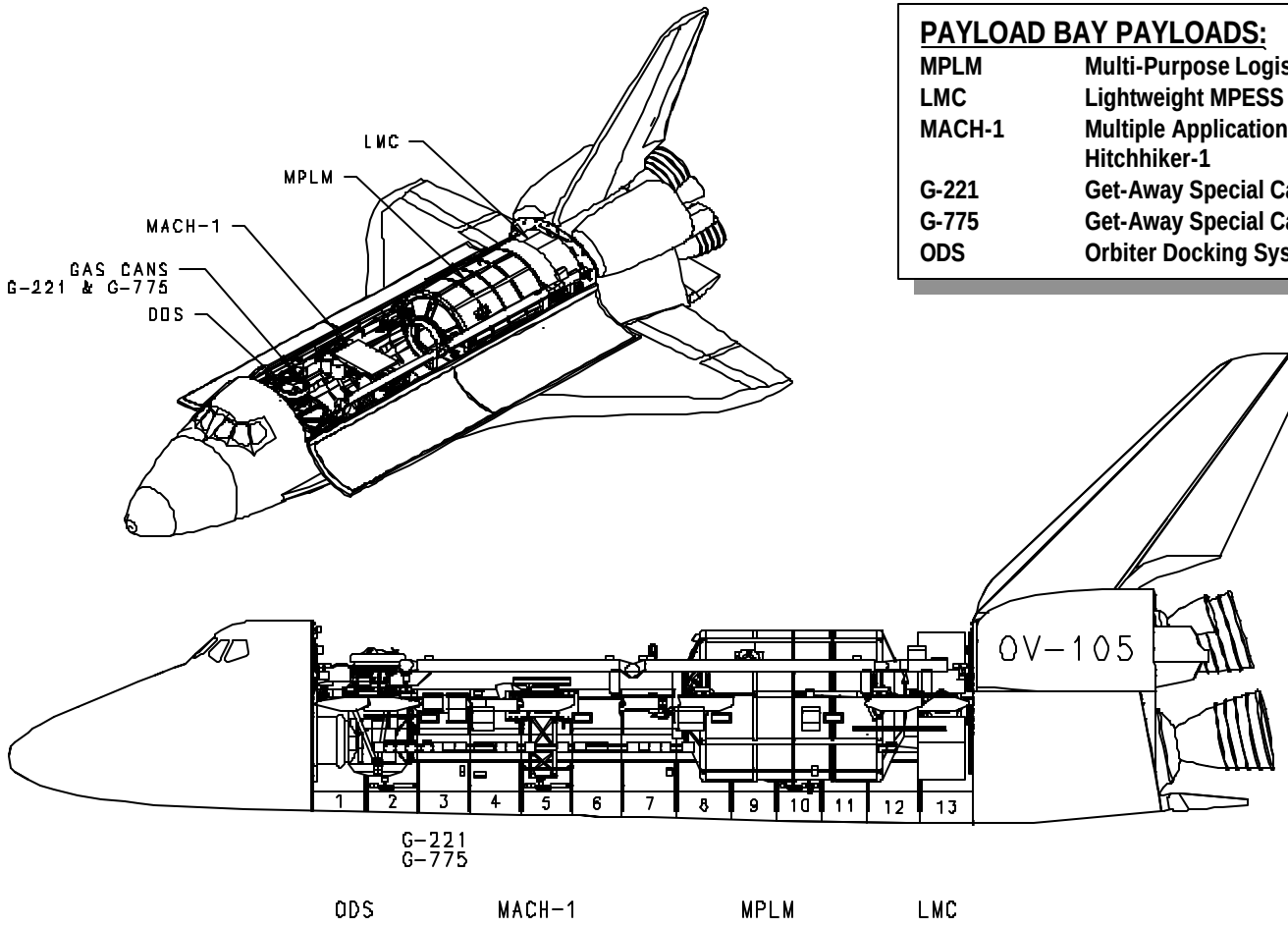
Agenda

• Program Integration - Flight Manager *	Robert Galvez
• Key Program Considerations	
• Payload & System Safety	
• Orbital Debris Status *	No Issues
• Payload In-Flight Anomalies	No Issues
• Launch Commit Criteria *	No Issues
• USA Program Integration *	
• Boeing Integration	
• Waivers to Vol X	No Issues
• System Integration TMR	Rod Wallace
• Program Anomalies	
• Flight Readiness Statement	

* Backup Material Included

Cargo Bay Configuration

Presenter Robert Galvez

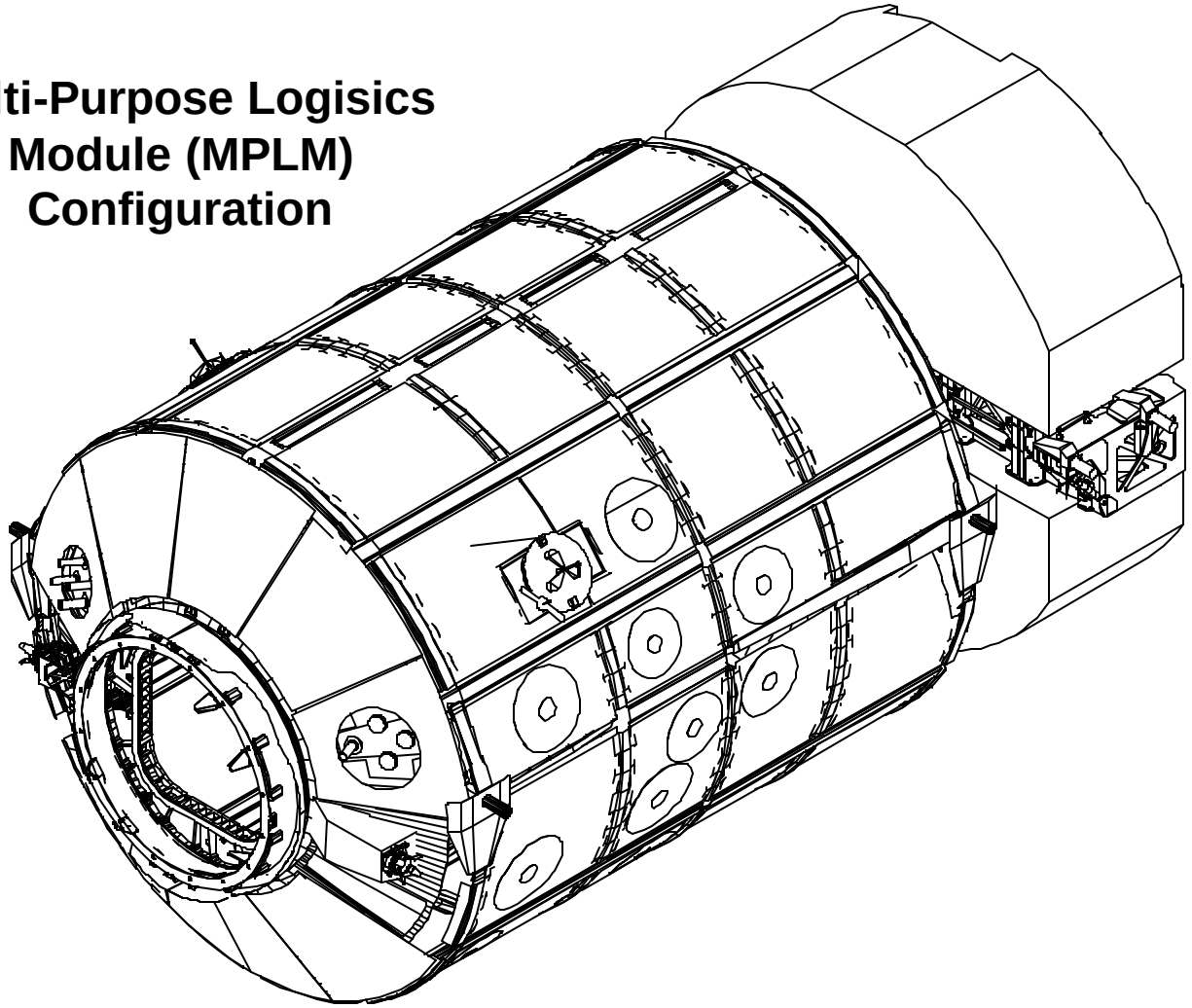


PAYLOAD BAY PAYLOADS:

MPLM	Multi-Purpose Logistics Module
LMC	Lightweight MPESS Carrier
MACH-1	Multiple Application Customized Hitchhiker-1
G-221	Get-Away Special Canister-221
G-775	Get-Away Special Canister-775
ODS	Orbiter Docking System

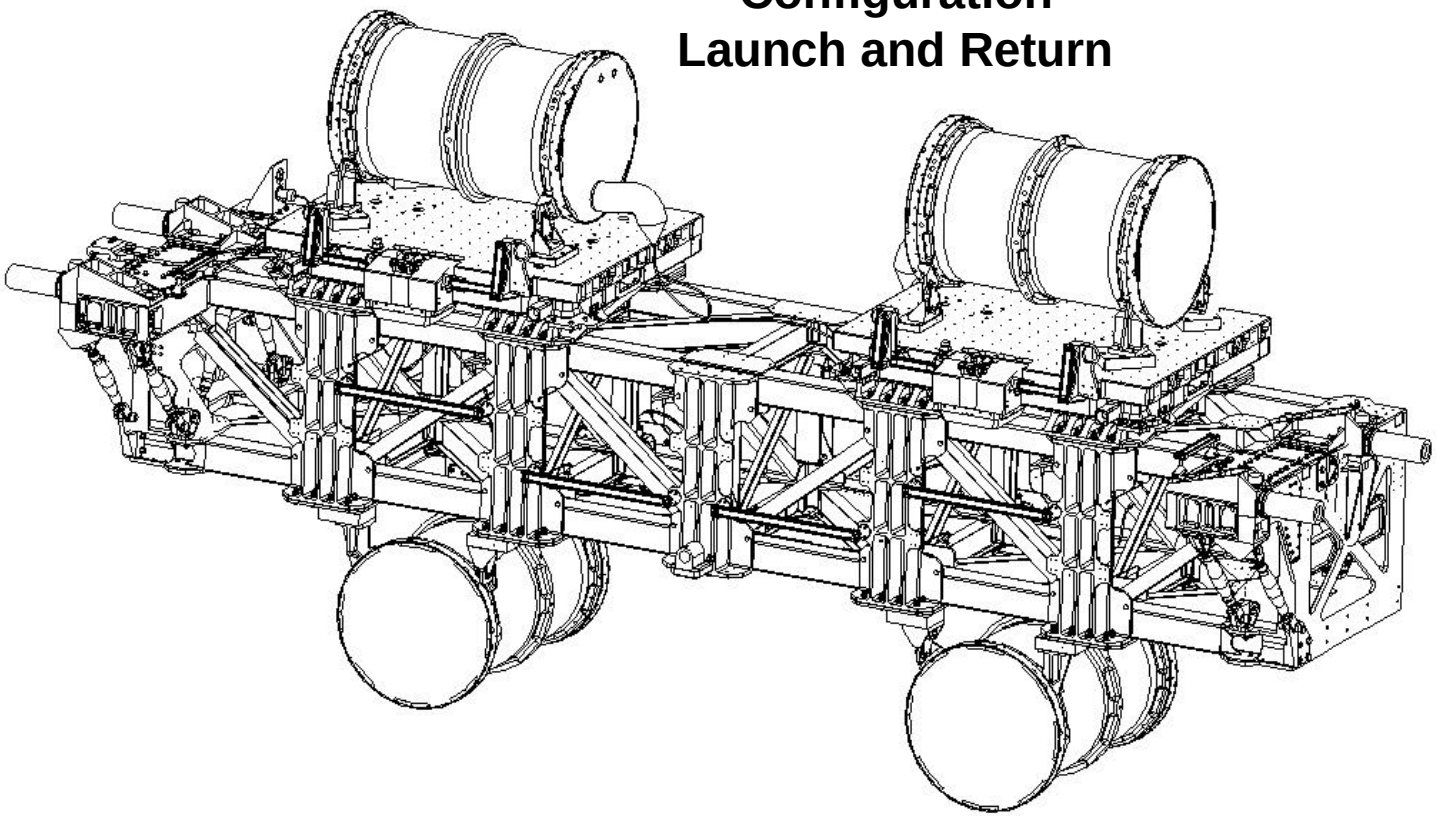
MPLM Payload

Multi-Purpose Logisics Module (MPLM) Configuration



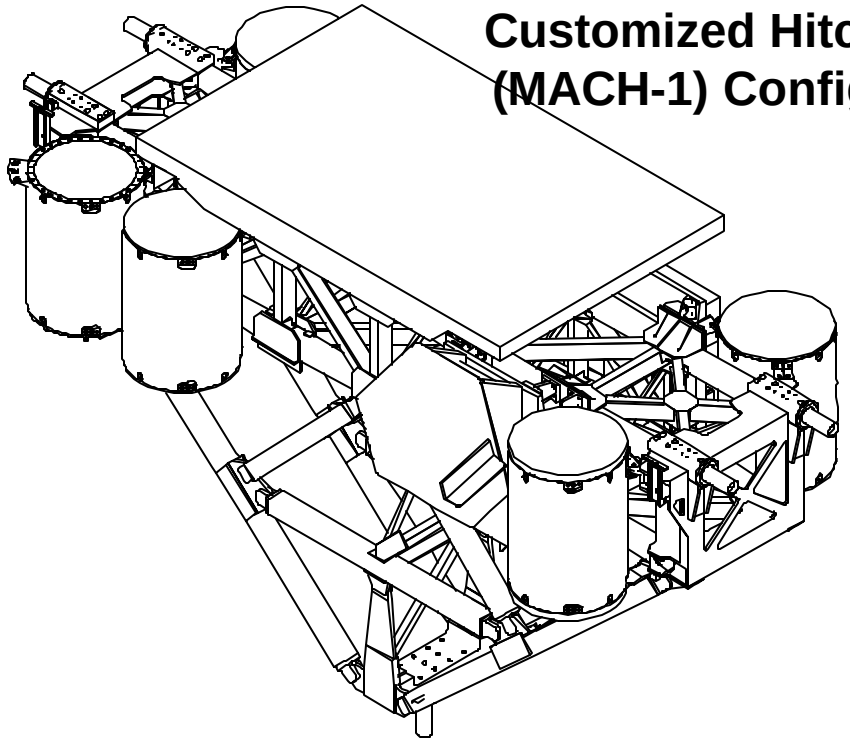
LMC Payload

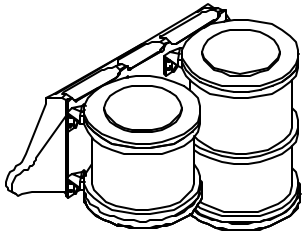
Lightweight MPESS Carrier (LMC) Configuration Launch and Return



MACH-1 and Bay GAS Canisters

Multiple Application Customized Hitchhiker-1 (MACH-1) Configuration





Bay 3 Get-Away Special (GAS) Canisters

Key Program Considerations

- **Mission Duration (11+0+2) / Pad Hold (+96 Hrs Margin)**
  - DI 122 supports FD3 rendezvous
  - One scheduled EVA within 11 day mission
  - 70 lbm of O_2 short of acquiring an additional mission day
- **EVA from Space Shuttle Airlock**
  - 4 hour EVA to perform BGA Thermal Blanket installation and get-ahead tasks
  - Decision made on 10/30; sufficient NBL training left in the flow
- **Middeck Stowage Strategy**
  - Critical crew rotation hardware is in middeck
  - Ascent manifest finalized
  - One 5 MLE stowage bag remains available for additional H/W requirements

Key Program Considerations (cont'd)

- **Return Configuration (Middeck & MPLM) Frozen**
  - **Changes to the baseline will be issued via CHIT**
- **KSC Processing**
  - **First time for MPLM Late Access Demonstration (11/17) and Stowage at the Pad (11/20-21)**

Payload and System Safety

- **Integrated Experiment Hazards Assessment – Complete**
- **Toxicology Process**
  - **Verification 1: Complete**
  - **Verification 2: Standard open work for late load items**
- **Payload Safety Review Process Is Complete**

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S061717 JSC-MS/3-1 STS-104 IFA
MPS LH_2 Feed System Overpressure

- **Observation**
  - **Pressure rise upstream of STS-104 ME-2 (Block II SSME 2051) in the Orbiter MPS LH_2 17 inch manifold was significantly higher than normal for previous engine configurations (including Block IIA)**
    - **Pressure from the single Block II SSME relieved through one or both of the prevalve relief paths back into the MPS LH_2 17-inch manifold, reaching 43 psia (above manifold relief valve min cracking pressure of 40 psia)**
    - **Peak manifold pressure for all Block IIA flights has been 38 psia or less, which is below min cracking**
    - **Significance: Nominal shutdown with STS-104 prevalve and manifold relief valve operation violates NSTS 07700 single fault tolerance requirement**
      - **Failure of a manifold relief valve would overpressurize the 17-inch manifold**

S061717 JSC-MS/3-1 STS-104 IFA MPS LH_2 Feed System Overpressure

- **Actions Taken**
  - Fault tree evaluation completed; no failures identified
    - IFA signature attributed to nominal performance of the Block II HPFTP
    - Unexpected pressure rise not seen in Block II testing because test stand hardware not configured to duplicate Orbiter hardware
  - System performance model generated by MSFC and Boeing
    - Verified with flight data: STS-51F; STS-68; STS-104; STS-105
    - Model indicates Block IIA dispersed case pressure rise potential comparable to Block II
  - Corrective action identified - extend MECO LH_2 prevalve close delay for both Block IIA and II engines by two seconds
    - I-load updates for STS-108 and subs authorized
    - I-loads for STS-108 have been updated (ref 09-20-01 PRCB)
    - I-loads for STS108 have been verified (ref 10-16-01 Sail Test)

- **Actions Taken (cont'd)**
  - Systems impacts of two second mated coast extension have been assessed and cleared for STS-108
    - TAL MECO targets - no redesign required
    - ET re-contact – within requirements
    - TAL hit probability – within requirements
    - ET disposal zone – within requirements
  - SSME pressure rise model documented as new SSP critical math model

- **Follow-On Plans**
  - Flight specific GN&C assessments until generic re-certification completed to support STS-112

STS-108 Flight Readiness Statement

THIS CERTIFIES THAT ALL MISSION REQUIREMENTS HAVE BEEN MET AND SPACE SHUTTLE INTEGRATION IS READY FOR FLIGHT, PENDING COMPLETION OF THE DEFINED OPEN WORK

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STS-108 Flight Readiness Review

Backup Charts

STS-108 Orbital Debris Status

- **Orbital Debris / Micrometeoroid Risk Is Acceptable**

Criteria	Risk	Guideline
Critical Penetration	1 in 586	1 in 200
Radiator Tube Penetration	1 in 2011	1 in 61
Window Replacements	42.6%	N/A

Launch Commit Criteria Changes for STS-108

- **STS-108 Minimum Equipment List (MEL) Mission Dependent**
- **LOX Liquid Level Sensor Failure Updates for STS-108**
  - **Provides requirements appropriate for recovery intervals after sensor failure and clarifies voting logic for sensor failure cases**

USA PROGRAM INTEGRATION FLIGHT PREPARATION PROCESS

Presenter:
Bob White
Organization/Date:
Program Integ/11-15-2001

- **All the Systems and Cargo Integration flight preparation activities have been completed except for planned open work – no issues identified**

- **Completed tasks include:**
  - Verification of compliance with generically certified requirements
  - Mission specific analyses
  - Documentation of vehicle and cargo requirements
  - Reconfiguration / installation of Payload Integration hardware
  - Payload bay clearance assessment

Program Integration Is Ready to Support Flight

STS-108 NASA System Integration TMR Flight Readiness

- Insight, audit and surveillance requirements complete
- No out-of-family problems have been identified for impact to safety of flight, or planned flight operations
- Approved Program requirements changes have been implemented and verified
  - ICD, OMRS, LCC
  - Vehicle configuration
  - DOSS configuration
  - NSTS 07700, Volume X
  - Joint requirements
- All Joint Shuttle / International Space Station on-orbit Systems Integration analyses have been completed and compatibility verified for STS-108-UF-1 baseline mission
- System Integration is ready for flight pending the completion of remaining open work

LH2 Feed System

LH2 FEED SYSTEM