



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



STS-100 Flight Readiness Review

April 5, 2001



Agenda

Presenter

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- • **Program Integration - Flight Manager**
 - **Mission Strategy ***
 - **Payload & System Safety**
 - **Orbital Debris Status**
 - **Payload In-Flight Anomalies**
 - **Launch Commit Criteria**
- **USA Program Integration**
- **Boeing Integration**
 - **Program Anomalies**
 - **Waivers to Vol X**
- **System Integration TMR**
- **Flight Readiness Statement**

Denny Holt

No Issues

No Issues *

No Issues *

No Issues

No Issues

No Issues *

*** Backup Material Included**



Mission Strategy (11+1+2)

Presenter **Denny Holt**

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- **11 day plan meets mission requirements with 3 EVA's**
 - **Extension day required for FD4 rendezvous**
- **SSRMS safe to stay on-orbit after EVA-1**
- **SSRMS operational after EVA-2**
- **Third EVA built into timeline as insurance for**
 - **SSRMS installation / activation**
 - **Spacelab Logistics Pallet (SLP) return**
 - **DCSU / FRAM**



Mission Strategy (11+1+2) (cont'd)

Presenter **Denny Holt**

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- **MPLM unberthing after SSRMS attached and safe**
- **Repress cabin after each EVA for maximum open hatch time**
 - **Support MPLM and Middeck transfers**
- **MPLM power management for cryo conservation**
 - **Pressure checks & heater management in bay**
 - **On ISS power while berthed**
- **Additional LiOH added for CO₂ removal risk mitigation**
 - **Extra LiOH in MPLM**
 - **Leave LiOH on ISS for Shuttle flexibility & ISS contingency**



Mission Strategy (11+1+2) (cont'd)

Presenter **Denny Holt**

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- **Return Stowage Configuration**
 - Only two Middeck lockers available for return
 - MPLM loading more flexible than last flight
 - Additional loads analysis provides envelope
 - Critical transfers defined and analyzed
- **Late ISS pre-dock configuration change assessed**
 - Mated loads acceptable
 - Mated Flight Control Stability acceptable



Payload and System Safety

Presenter **Denny Holt**

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



STS-100 Orbital Debris Status

Presenter **Denny Holt**

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

<u>Criteria</u>	<u>Risk</u>	<u>Guideline</u>
Critical Penetration	1 in 696	1 in 200
Radiator Tube Penetration	1 in 1456	1 in 61
Window Replacements	32%	N/A

USA PROGRAM INTEGRATION FLIGHT PREPARATION PROCESS

- **All the Systems and Cargo Integration flight preparation activities have been completed except for standard 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

USA Program Integration Is Ready to Support Flight



STS-100 Flight Readiness Statement

Presenter

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

/s/ Rodney O. Wallace for

**L. D. AUSTIN, JR., MANAGER
SPACE SHUTTLE SYSTEMS INTEGRATION**

/s/ P. A. Pryor for

**F. R. HINSON, ACTING ASSOC. PROG. MGR
PROGRAM INTEGRATION
UNITED SPACE ALLIANCE**

/s/ Richard N. Richards

**R. N. RICHARDS, PROGRAM DIRECTOR
SHUTTLE & SPACE STATION INTEGRATION
BOEING HUMAN SPACE FLIGHT &
EXPLORATION**

/s/ Michele A. Brekke

**M. A. BREKKE, MANAGER
SPACE SHUTTLE CUSTOMER AND
FLIGHT INTEGRATION**

/s/ Jeffrey G. Williams for

**A. M. LARSEN, MANAGER
PAYLOAD SAFETY**

/s/ R. L. Segert

**R. L. SEGERT, MANAGER
SPACE SHUTTLE KSC INTEGRATION**

/s/ J. D. Holt

**J. D. HOLT, FLIGHT MANAGER
SPACE SHUTTLE PROGRAM INTEGRATION**



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Backup Charts



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Space Shuttle Program Integration

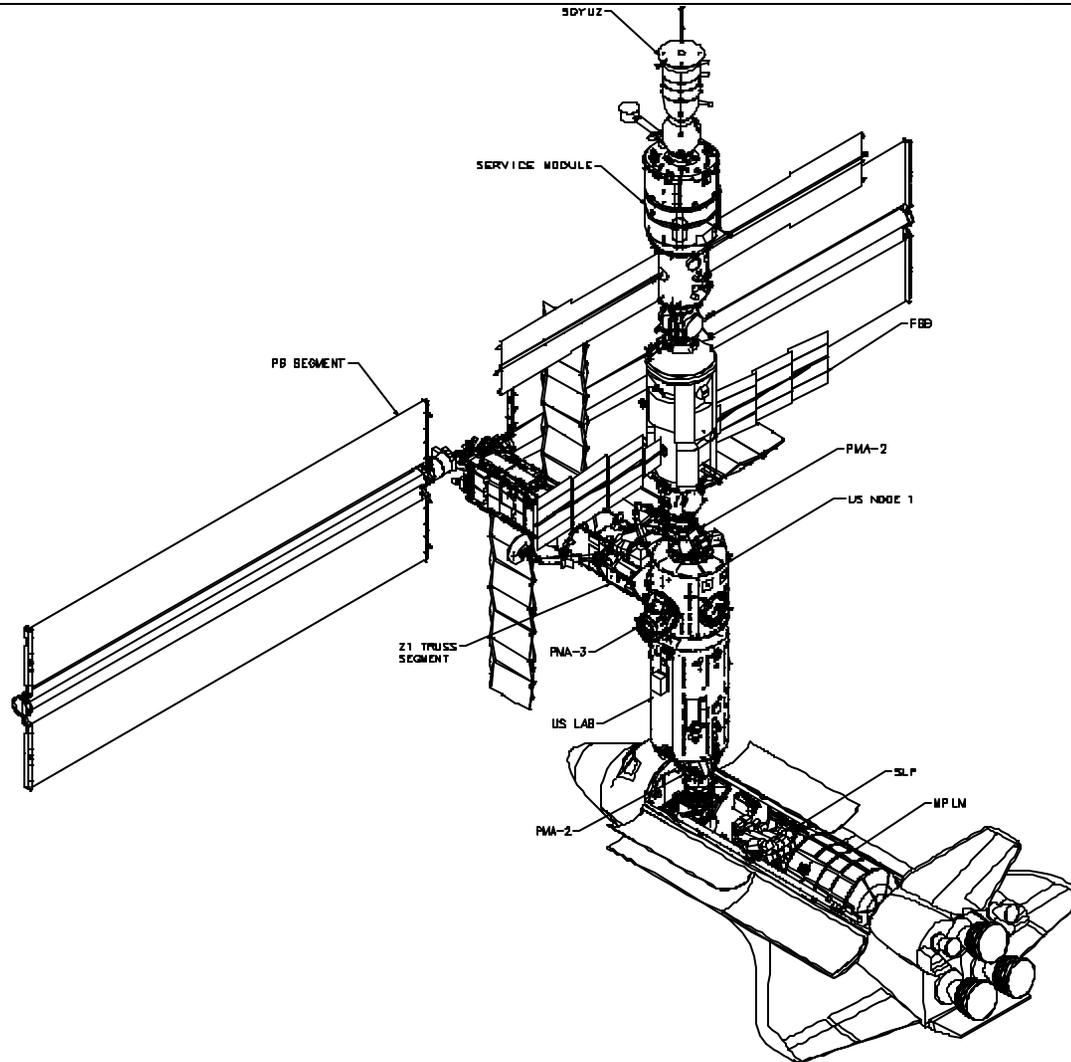
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STS-100 ISS / Orbiter Docked Arrangement Prior to SSRMS Deploy

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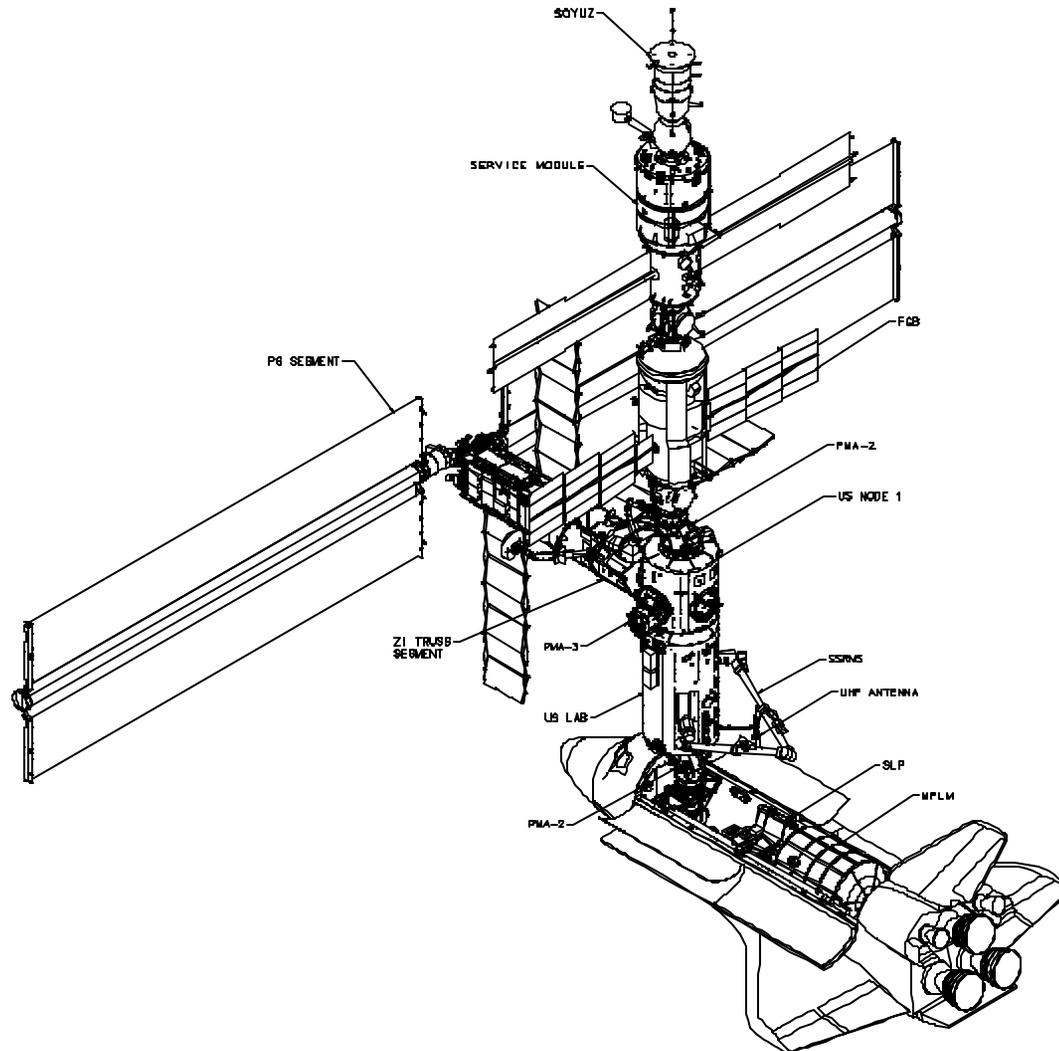
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STS-100 ISS / Orbiter Docked Arrangement Following SSRMS Deploy

Presenter **Denny Holt**

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Launch Commit Criteria Approved for STS-100

Presenter **Denny Holt**

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- **Minimum Equipment List (MEL) Mission Specific**

**SYSTEMS & CARGO INTEGRATION
ANALYSES & REQUIREMENTS****Presenter:**

Bob White

Organization/Date:

Program Integ/04-05-2001

- **STS-100 has been evaluated for compatibility with all generically certified systems requirements - no issues**
- **Mission specific Systems and Cargo Integration analyses have been completed except for standard planned work – no issues**
- **STS-100 flight elements and cargo configuration requirements have been developed and released in appropriate documents and engineering drawings - no issues**

SYSTEMS AND CARGO VERIFICATION	Presenter: Bob White
	Organization/Date: Program Integ/04-05-2001

- **Have verified that STS-100 ascent design criteria operates within the PE certification limits for all critical parameters - no issues**
- **Supported the testing and verification for DOSS - no issues**
 - Standard planned work remaining - L-2 day verification testing
- **Payload Integration hardware reconfiguration and Interface Verification Tests (IVT's) have been completed or planned - no issues**

CLEARANCE ANALYSIS

Presenter:

Bob White

Organization/Date:

Program Integ/04-05-2001

- **CAD models from ISSP are used for PLB clearance verification**
- **A risk mitigation plan to ensure compliance with ICD and CAD models was developed and accomplished**
 - MPLM “As-Designed” CAD model analysis
 - Actual MPLM measurements evaluation
 - Photographic review
 - Visual inspection
- **Three discrepancies were identified in the mitigation activities and subsequently resolved by ISSP and SSP**

Ready For Flight



**STS-100 NASA System Integration TMR
Flight Readiness**

Presenter **Rod Wallace**

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- **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-100-6A baseline mission**
- **System Integration is ready for flight pending the completion of remaining open work**