



**SPACE SHUTTLE PROGRAM**  
**Space Shuttle KSC Integration Office**  
NASA Kennedy Space Center, Florida



# STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **03-04-10**

## Program Freeze Point

## PRCB Presentation

## S115133B



# STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **03-04-10**

Baseline the STS-133 Mission Specific Requirements and Flow Plans. The STS-133 Integrated Launch Site Requirements were established by PRCBD S115133A dated 01-28-10. This CR and the Associated Data Package were reviewed at the 03-01-10 FRWG.

**Flight Operation & Integration\***

**MO3/USA-PI**

**Orbiter Engineering\***

**USA-OE**

**KSC ISS and Payload Processing**

**UB-R3**

**Launch Vehicle Processing**

**PH-A**

**Status in BackUp**

**KSC Integration\***

**MK-SIO**

**Flight Software**

**USA-FSW**

**Orbiter GFE\***

**MV5**

**EVA**

**XA**

**Payload/Cargo Engineering**

**USA-PI**

**SSME**

**Status at DLSFR**

**MP21**

\*Backup material included



**SPACE SHUTTLE PROGRAM**  
**Space Shuttle Flight Operations and Integration Office**  
NASA Johnson Space Center, Houston, Texas



# **STS-133 LSFR**

## **PRCB Flight Requirements Status**

**March 4, 2010**

**Michael Darnell, Lead MIM**

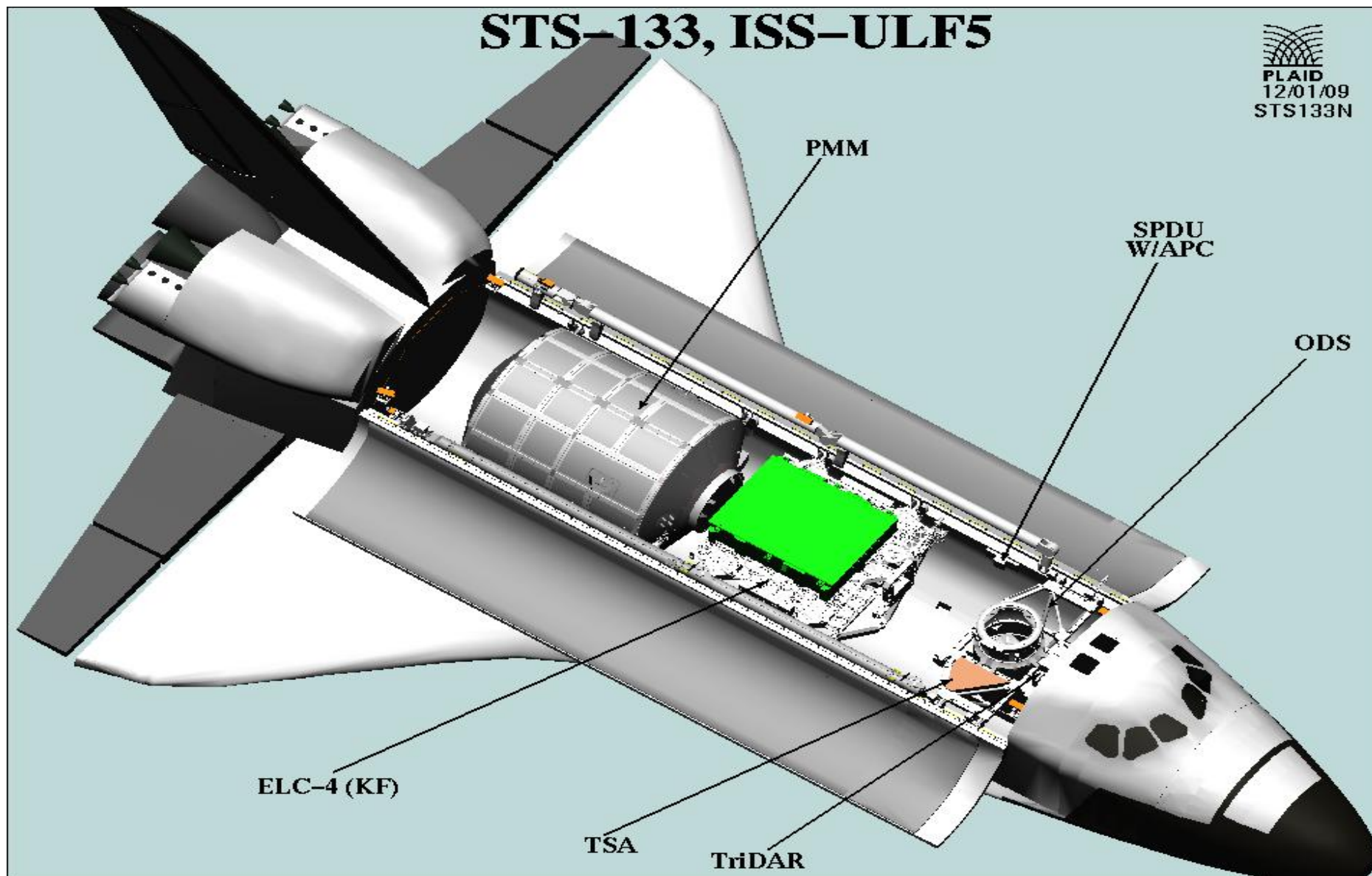


## On Orbit Cargo Bay Configuration

Presenter **Michael Darnell**

Date **3/04/2010**

Page **2**





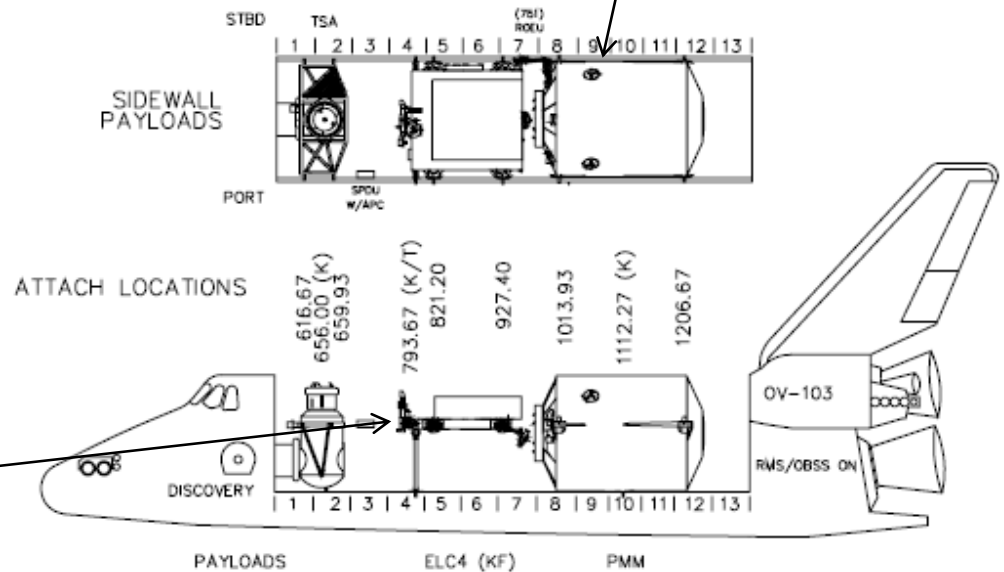
<b>STS-133 Payload Integration Services/Interfaces</b>		Presenter <b>Michael Darnell</b>
Date <b>3/04/2010</b>	Page <b>3</b>	

**Middeck Powered Payloads**

- GLACIER – rear breather (36 CFM) (Up/Dn) - 160 W    ↑ ↓
- CGBA-NLP - 65W    ↑ ↓
- Mouse Immunology (MI) Animal Enclosure Module (AEM 1 & AEM 2) - 36W each    ↑ ↓

**MPLM (PMM)- 1<sup>st</sup> Flight this location    ↑**

- 4 active longeron latches with aft primary
- 1 active keel latch with keel camera
- ROEU provides 28V heater power, 124V for temp and pressure checks, and 1553 for command / telemetry

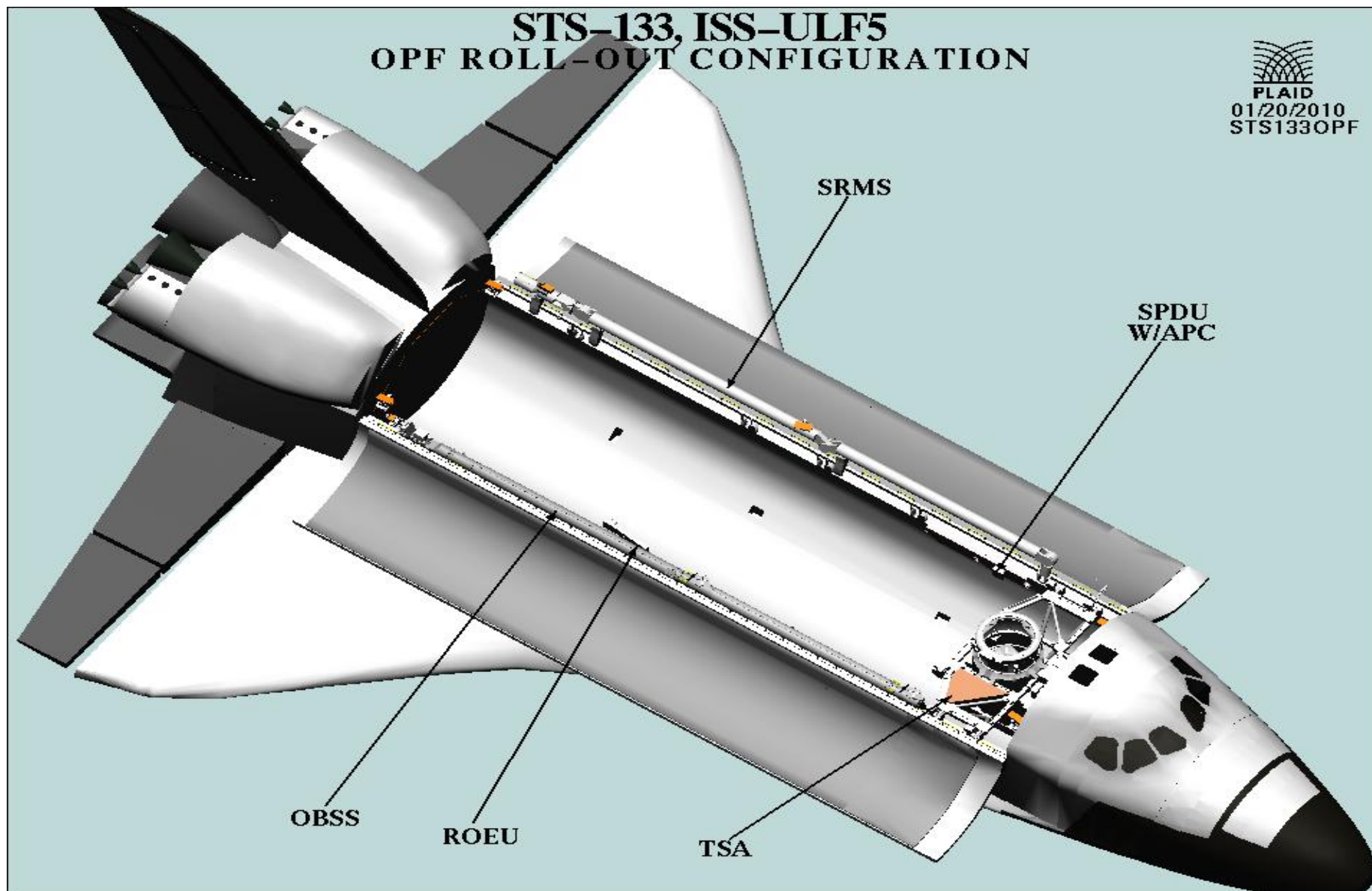


**ELC 4**

- Deck Assembly:    ↑
  - Deployable
  - 4 active longeron latches (fwd primary)
- Keel Assembly:    ↑ ↓
  - 2 passive longeron latches
  - 1 passive keel latch
- No power required for ELC4



<b>Empty Cargo Bay Configuration</b>		Presenter <b>Michael Darnell</b>
		Date <b>3/04/2010</b>   Page <b>4</b>





**STS-133 LAUNCH SITE FLOW REVIEW (FRWG)**

Presenter <b>Michael Darnell</b>
Date <b>3/04/10</b>

**LAUNCH**

09/16/10  
 39A/ MLP2  
 CREW SIZE: 6UP/6DN

**CONFIGURATION**

OV-103(39)  
 LP01;RP03  
 ET-138  
 BI-145  
 RSRM-113  
Proposed (1) 2059 (2) 2061 (3) 2057  
 OI-34  
 SRMS, OBSS, ODS, SSPTS

**CARGO BAY PAYLOAD**

ISS-ULF5  
 (ELC4, PMM)

**MIDDECK PAYLOADS**

ISS-ULF5  
 MAUI  
 SEITE  
 SIMPLEX  
 RAMBO-2

**ORBIT**

51.6 DEG  
 122 NM  
 DIRECT INSERTION  
 DURATION: 8 + 1 + 2 DAYS  
 EVAs 0+1+2 (No Scheduled)

**CONSUMABLES**

CRYO TANK SETS	4 (OFFLOAD)
GN2 TANKS	5 (FULL)
FWD RCS	1912# (OFFLOAD)
AFT RCS	4970# (FULL)
OMS	22760# (Standard Offload)

**LANDING**

SITE	KSC
TAL	ZARAGOZA
ALT. TAL	MORON & ISTRES
SCA	911



## STS-133 LAUNCH SITE FLOW REVIEW (FRWG)

Presenter

**Michael Darnell**

Date

**3/04/10**

### PERFORMANCE MARGIN

<b>SIMULATION MARGIN (SPLAF133)</b>		<b>+1578</b>
<b>WEIGHT CHANGES SINCE SIMULATION</b>		
PAYLOAD	- 125	
OPERATOR	+51	
ORBITER	- 8	
CREW COMPARTMENT	<u>+350</u>	
<b>TOTAL WEIGHT CHANGES</b>	<b>+268</b>	<b>- 268</b>
<b>OTHER PERFORMANCE PROJECTIONS</b>		
RENDEZVOUS ALT OF 200 NM		<b>+580</b>
PROTECTION FOR DOL DISPERSIONS		<b>- 700</b>
09/16/10 LAUNCH DATE (PMBT&ATMOS)		<b>+260</b>
SRB – M.P. UPDATES		<b>- 2</b>
SRB – BR / 0.55 MIL LOWER THAN 0.3705 AVG		<b>- 198</b>
PROJ TO 5 MIN WINDOW FROM INPLANE		<b>- 600</b>
PERFORMANCE CHANGES ADJUSTMENT		<u><b>+19</b></u>
<b>CURRENT BASELINED APM (02/23/10)</b>		<b>+669</b>





**STS-133 LAUNCH SITE FLOW REVIEW (FRWG)**

Presenter <b>Michael Darnell</b>
Date <b>3/04/10</b>

**PERFORMANCE MARGIN**

- **CURRENT BASELINED APM (02/23/10)** **+669**
  
- **IPT PROJECTIONS**
  - **LOWER ISS RENDEZVOUS ALTITUDE TO 190 NAUTICAL MILES** **+1160**
  - **ADD 1,000 LBS TO PMM** **+1000** **- 930**
  - **REDUCE ELC BY 125 LBS** **- 125** **+116**
  - **ADD 150 LBS FOR ORBITER WEIGHING** **+150** **- 140**
  - **SRB BURNRATE ADJUSTMENT** **- 200**
  - **IPT PROJECTION SUBTOTAL** **+ 6**
  
- **TOTAL IPT PROJECTED APM** **+ 675**

**VOLUME III: ASCENT PERFORMANCE MANAGER'S RESERVE GUIDELINE AT LSFR/LSRR IS 400 LBS**



**STS-133 LAUNCH SITE FLOW REVIEW (FRWG)**

Presenter <b>Michael Darnell</b>
Date <b>3/04/10</b>

**FLIGHT MASS PROPERTIES**

<u>CASE</u>	<u>TOUCHDOWN</u>		<u>MACH 3.5</u>	
	<u>WEIGHT pounds (LIMIT)</u>		<u>X C.G. inches (LIMIT)</u>	
NOMINAL	202487	(233000)	1080.1	(1075.7)
RTLS	240090	(245000)	1080.8	(1077.2)
TAL	237911	(244000)	1080.6	(1077.2)
AOA	232651	(242000)	1076.4	(1075.7)
CONT RTRN**	233829	(233000)	1078.0	(1075.7)

\*\*CONT RTRN EXCEEDS 233K NEOM LIMIT (See Vol. X Bk. 1 Sec. 3.3.1.1.9)

**NOTE: 104 LBS AFT FUS. BALLAST (EMPTY BOXES)**  
**RTLS INCLUDES 25 SEC FRCS DUMPS**  
**TAL INCLUDES 65 SEC FRCS DUMPS**

**ESTIMATES BASED ON SPLAF133 AND MODIFIED FOR WEIGHT CHANGES THRU 02/23/10.**



## Flight Requirements Status

Presenter **Michael Darnell**

Date **3/04/2010**

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### PRCB CR's

- None

### ULF5 MIP (NSTS 21554):

- Current version available on PILS: Rev. A PCN-1, February 5, 2010
- Recently approved MIP CRs:
  - 21554, MIP CR#0004 Update Utilization Payloads and Appendix E
- Pending CRs:
  - 21554, MIP CR#0005 Update ULF5 MIP Priorities

### Open Assessment:

- KSC flow impacts for the removal of the TriDAR DTO and the addition of the DragonEye DTO during the OV-103 Flow for STS-133

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# **STS-133 LSFR**

**OV 103 / FLT 39  
PRCB**

**Belinda Soublet  
USA Orbiter Element  
March 04, 2010**

# STS-133 OV 103/FLT 39 – Orbiter LSFR Baseline

---

## Modifications To Be Baselined at LSFR for OV 103 / FLT 39

- None

## Potential Modification for STS-133 OV 103 / FLT 39

- To be presented

## Additional Requirements being tracked:

- Chits

### •Backup

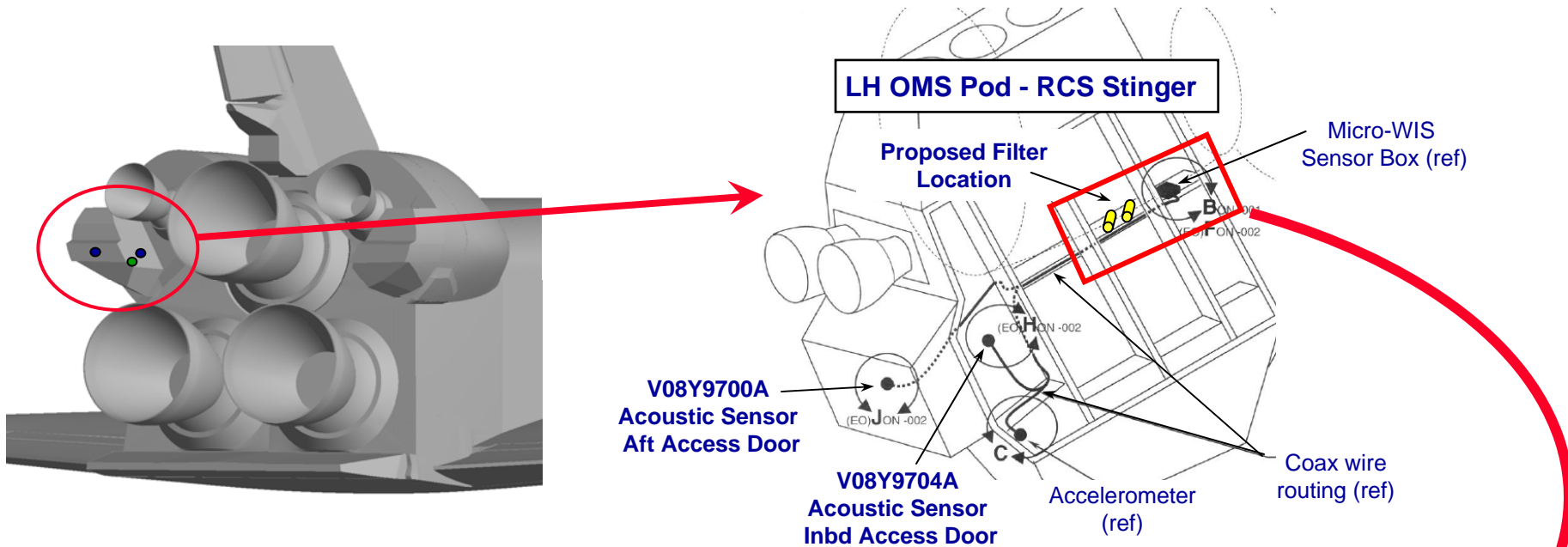
- Information previously presented at STS-133 LSRR
  - STR/TPS Priorities
  - Potential modifications previously presented (info only)
  - Opportunity modifications previously presented (info only)
  - STS-133 Weight Saver Mission Kit Changes (Info Only)

# STS-133 Potential Modification (Info Only)

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- **TAD 30283 MEI Acoustic Sensor Filter Mod**
  - Completion of MADS low pass in-line filter installation for MEI acoustic sensors (microphones) in the LH OMS pod stinger
    - Contingent upon whether or not both filters are installed prior to STS-131
  - Mod consists of re-routing existing coax cable from the acoustic sensor to the new in-line filter mounted with a saddle clamp, and routing a new cable from the filter to the micro-WIS box
  - If not completed prior to STS-131, the remainder of the mod and tech order work will be brought forward at the STS-133 DLSFR
    - Deferred portion of mod record and final tech order configuration would be authorized

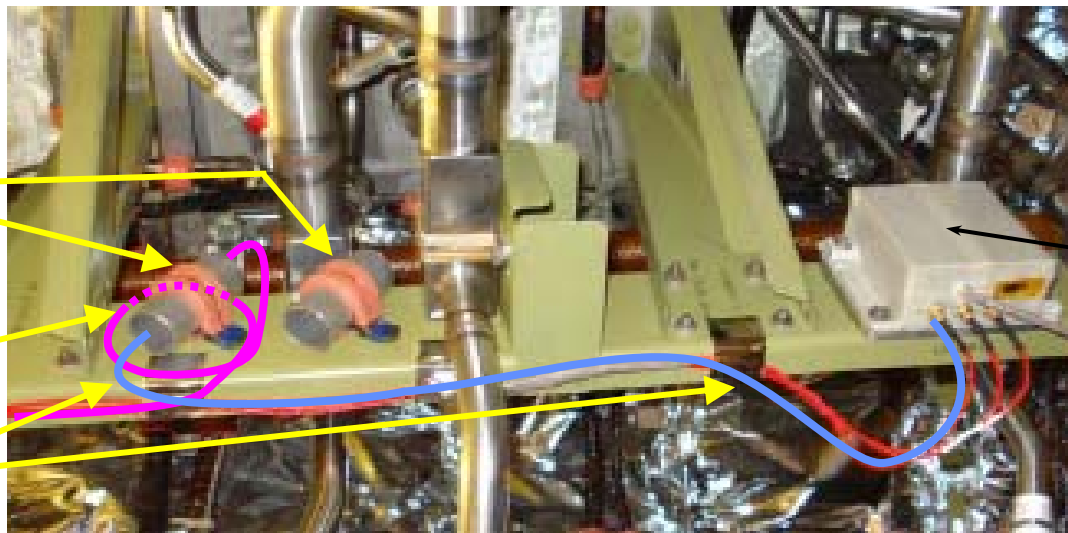
# MEI Acoustic Sensor Filter Mod



**Mockup of new in-line filter / clamp locations**

**Existing coax is routed to filter instead of micro-WIS**

**New coax is routed from filter to micro-WIS**



**Micro-WIS Sensor Box (ref)**

# STS-133 Chits

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- **Approved**

- J6275A Orbiter Structure IML Surface Corrosion Sampling Inspection
- J6526 Evaluation of OMS Pod LI-900 Tile Installed on 0.090" SIP
- J6531 Metris Scan of OV-103 Lower Surface
- J6534 Putty Repair Tile Replacement for Risk Reduction
- J6543 ET Ferry Flight Door Attach Fitting Inspection
- **J6577 Ames Gap Filler Removal and Replacement**
- J6578 Capture OV-103 Output Waveforms to Address 1N3600 Diode Concerns
- J6585 Optigo and Z-scan of BLT Protuberance Tile
- **J6587 R&R of Inertial Measurement Unit (IMU) S/N 213 (MC409-0126) with S/N 204 on OV-103 in IMU slot 1 Prior to STS-133**
- K6516A Ground Lightning Monitoring System (GLMS) Installation
- K6566 SSME Nozzle Purge Hot Wall Corrosion Prevention

- **Pending**

- J6589 Crew Module Contamination Sampling
- JXXXX STS-133 ELC MGSE Measurements
- JXXXX Payload Close Clearance Measurements
- J6599 Pre-Flight Citric Acid Flush

- **Potentials**

- EVA Winch Attach Point Inspection





# STS-133 Launch Site Flow Review



## KSC International Space Station and Spacecraft Processing

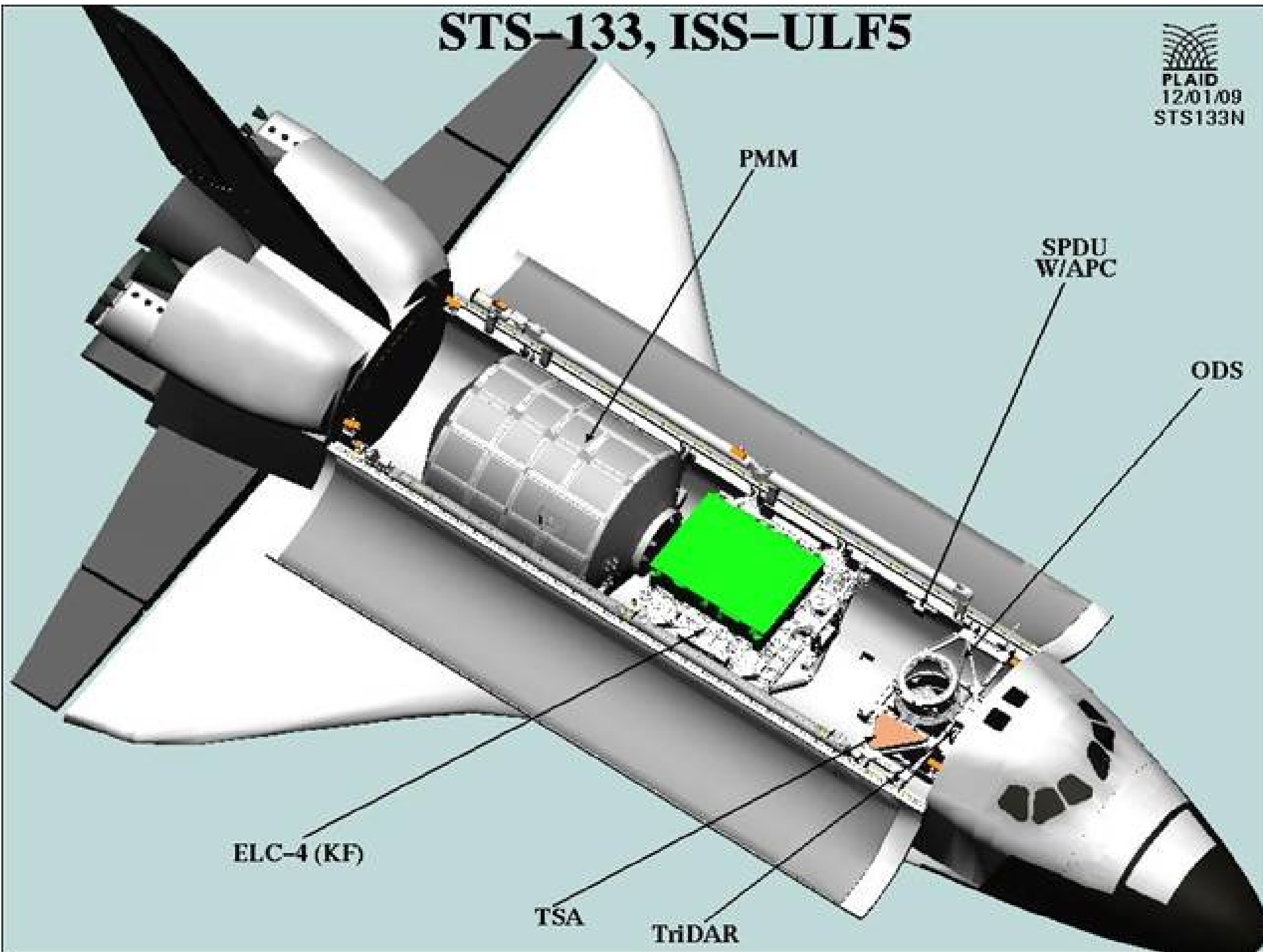
### ISS-ULF5

**EXPRESS Logistics Carrier 4 (ELC4) with Heat Rejection System  
Radiator (HRSR) Orbital Replacement Unit (ORU)  
Permanent Multi-purpose Module (PMM)**

**Scott Higginbotham / UB-R  
ULF5 NASA-KSC Mission Manager  
March 4, 2010**

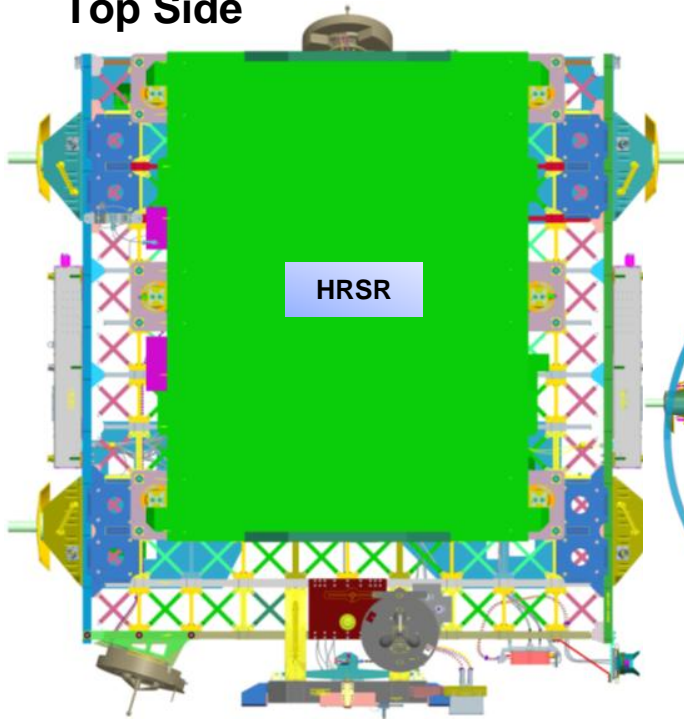
# STS-133, ISS-ULF5

PLAID  
12/01/09  
STS133N

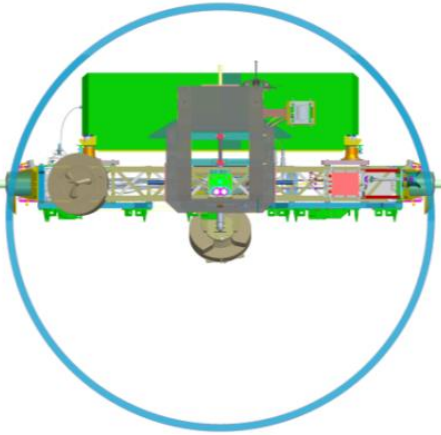


# ELC4 Configuration

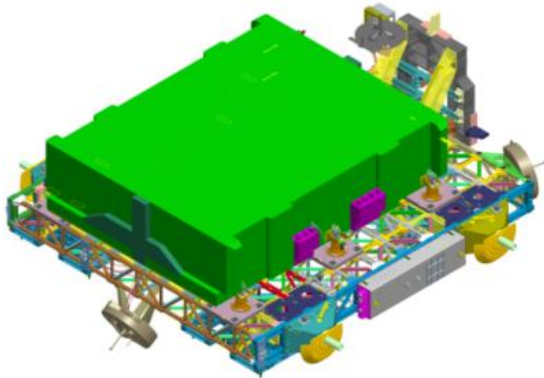
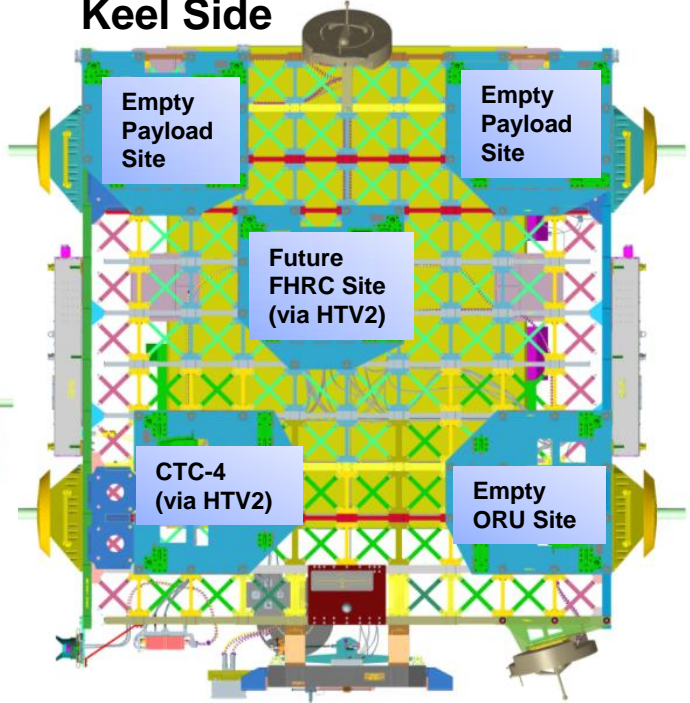
Top Side



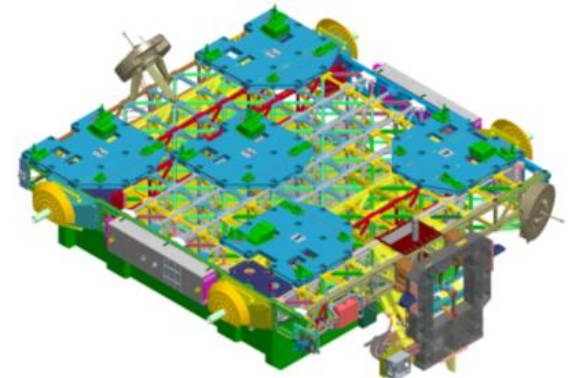
No Orbiter 87" or 90" violations



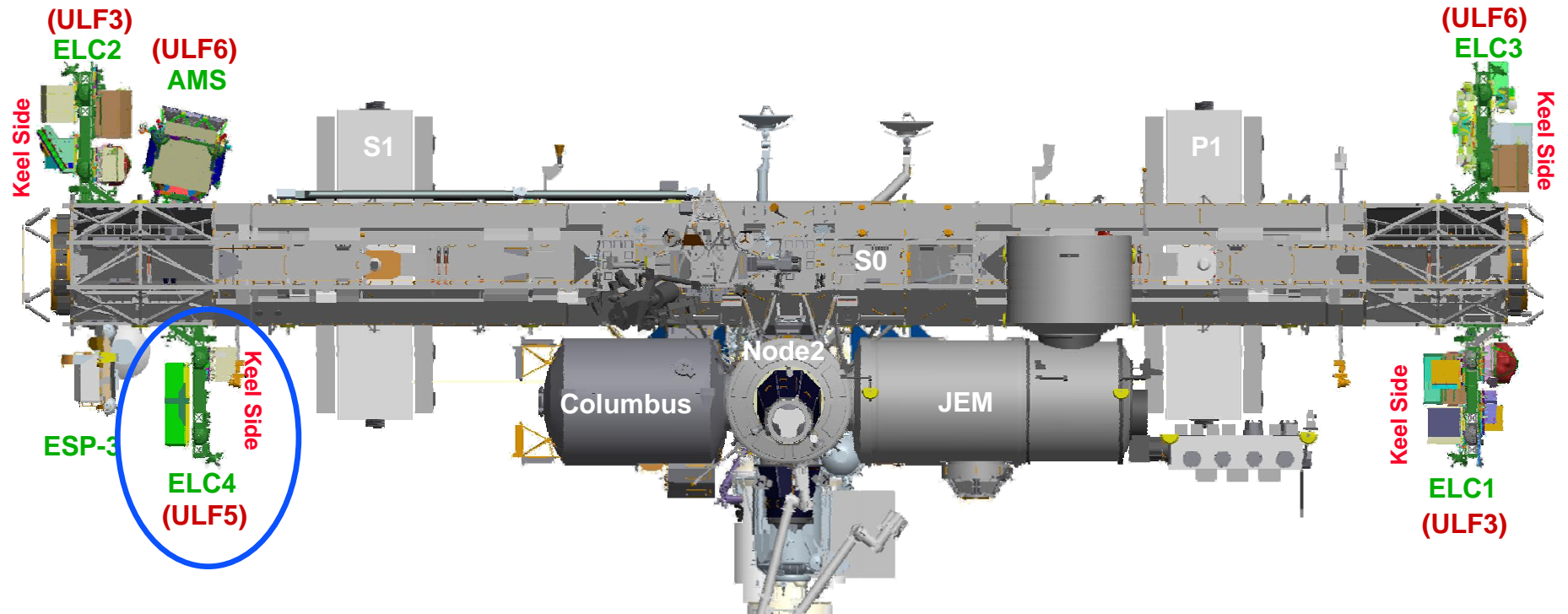
Keel Side



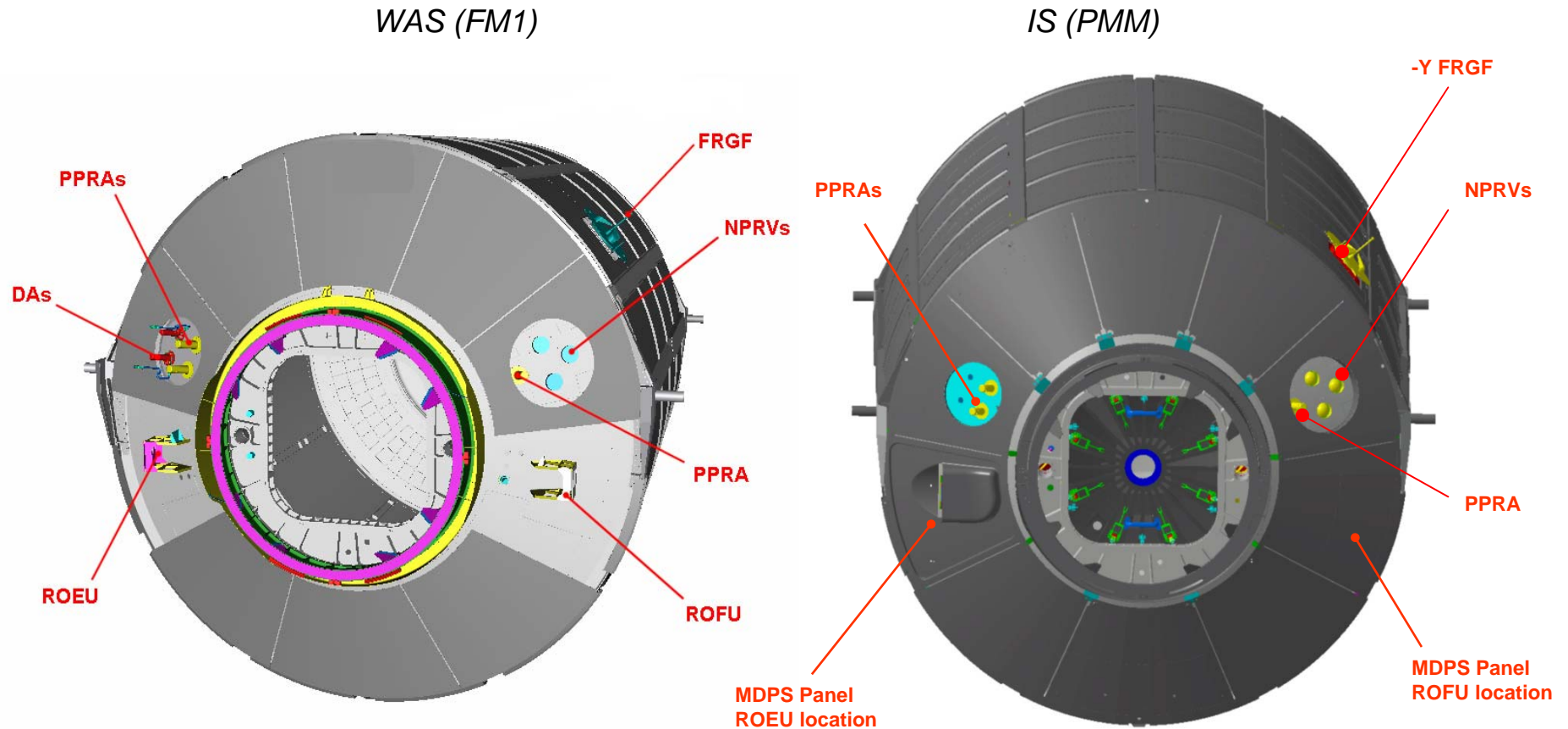
HRSR ORU



# ELC4 Berthing Location on ISS

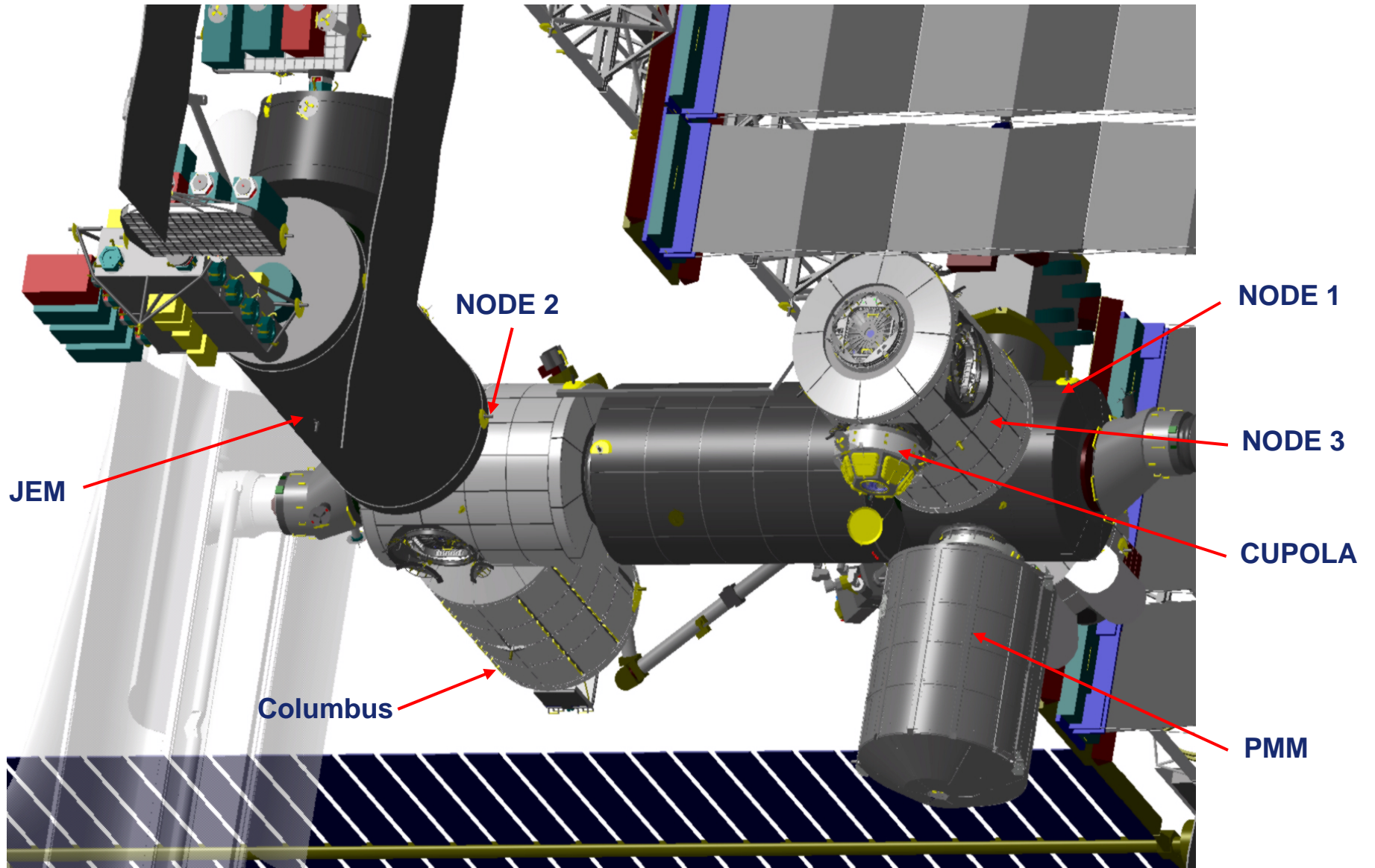


# PMM External Configuration (proposed)

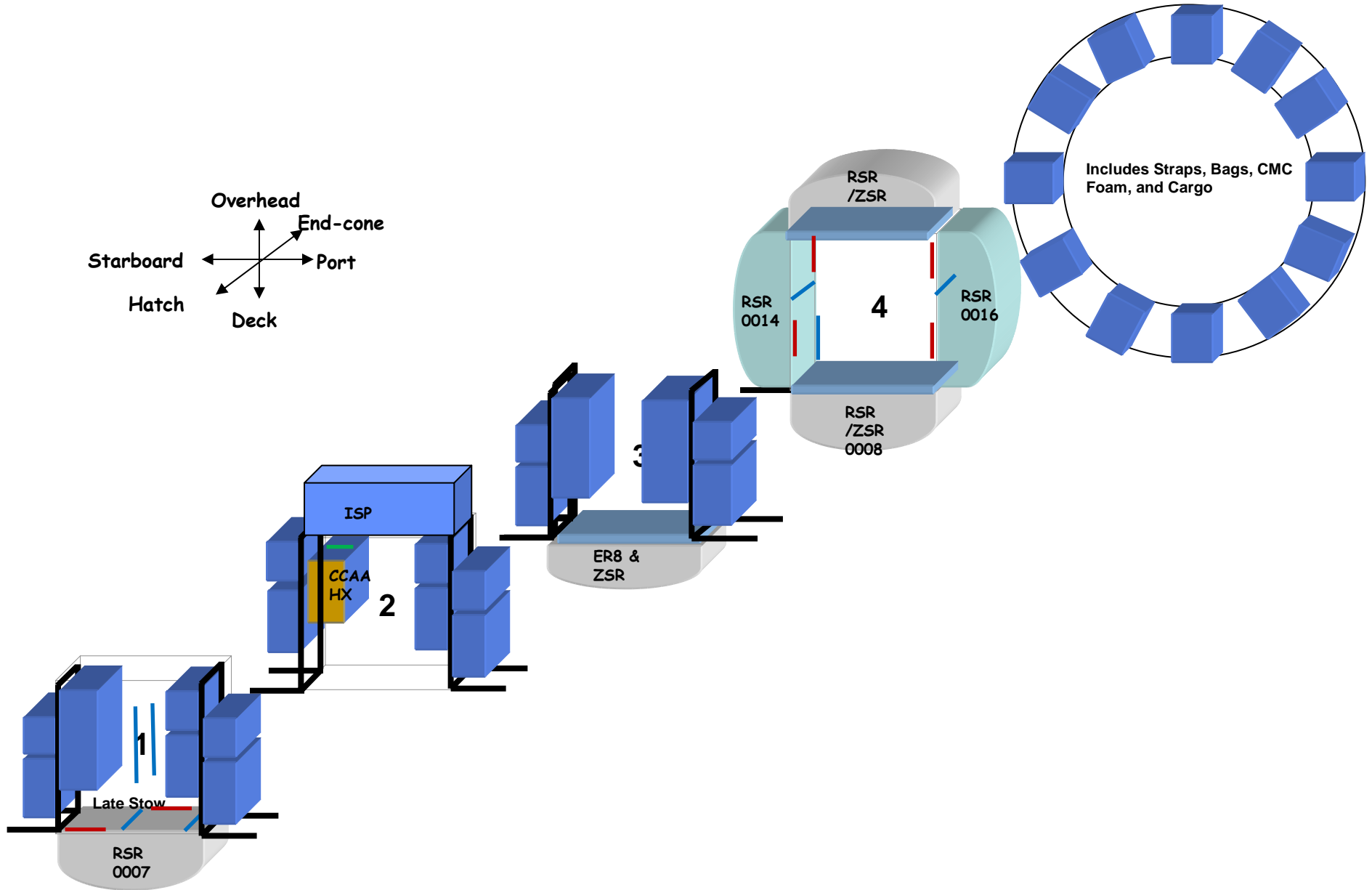


**Modifications to include: Removal of +Y FRGF, removal of ROFU components, replacement of CBM seal, installation of new forward end cone MMOD shields, feed through seal replacement, visiting vehicle retro-reflector installation, modification of MLI underneath MMOD shields to add Nextel/Kevlar “mattresses”, and much more!**

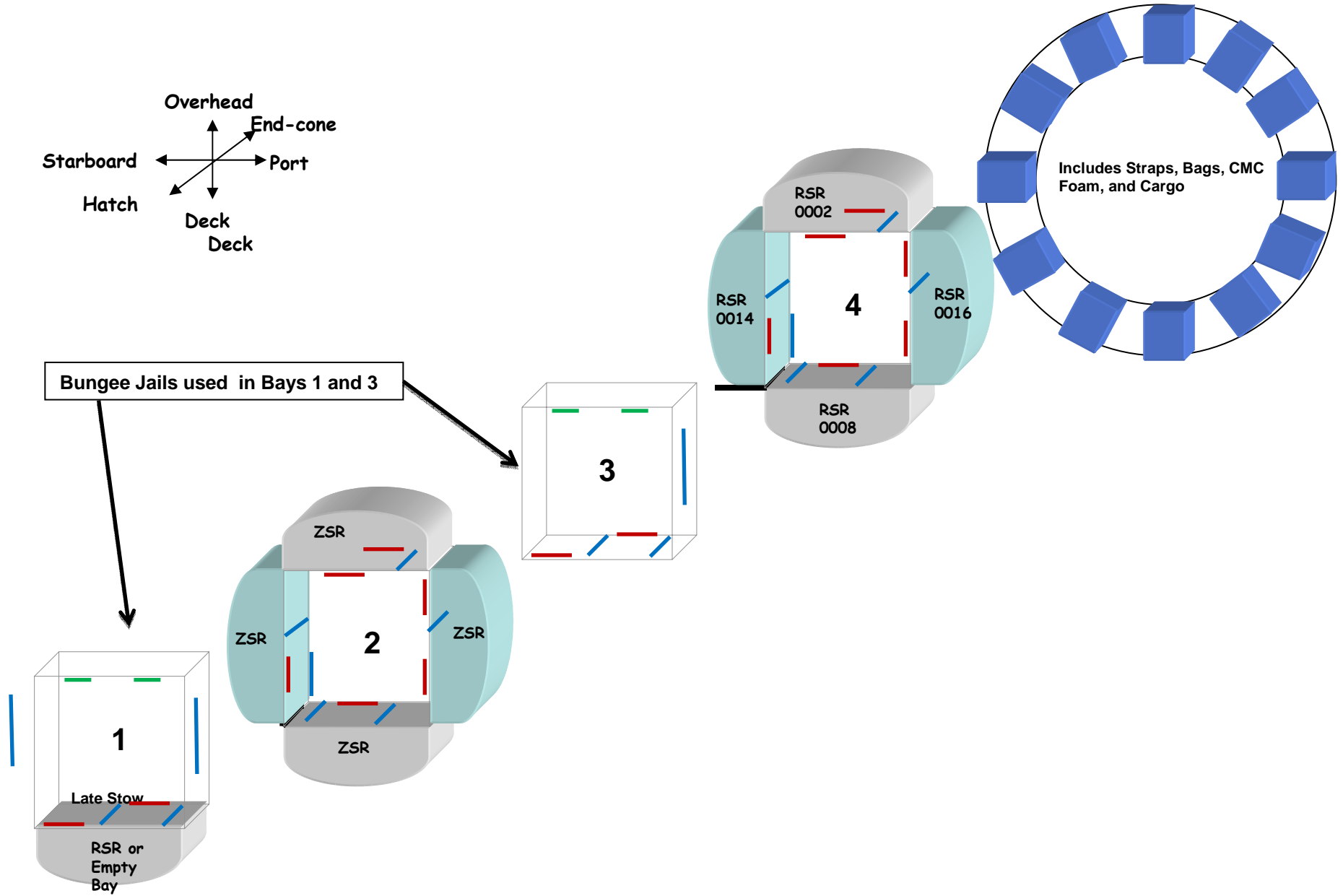
# PMM Berthing Location on ISS



# PMM Rack Configuration for Launch (proposed)



# PMM Rack Configuration on Orbit (proposed)







# ULF5 Hardware Processing Status Summary



## **ExPRESS Logistics Carrier 4 (ELC4)**

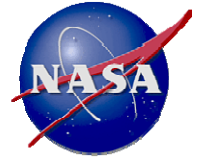
- ELC arrived at KSC via C-5 on 15 August 2009
- Assembly operations are underway and ahead of schedule
  - PFAP (five each) build up operations are complete
  - PCASS/ACASS test complete
  - PFAP cable termination and kinematic mount match drilling ops are complete
  - Cable routing/securing underway
- Flight ExPRESS Carrier Avionics (ExPCA) arrived at KSC on 2/19/10
- HRSR ORU in dwell
- HRSR Flight Support Equipment on schedule to arrive at KSC on 4/1/10

## **Permanent Multi-purpose Module (PMM)**

- Donatello (MPLM FM3) MLI removed and sent to TASI for modification
- Leonardo (MPLM FM1) in final preparations for upcoming STS-131/19A mission
- Change Request (CR11801) to baseline modifications necessary to transform MPLM FM1 into the PMM is scheduled for approval at the SSPCB on 3/2/10



# ULF5 Processing Milestones

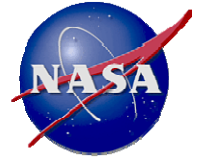


## ELC4

- ELC4 On Dock KSC 15 August 2009
- ExPCA #4 On Dock KSC 19 February 2010
- HRSR FSE On Dock KSC 1 April 2010
- Install ExPCA #4 onto ELC4 19 May 2010
- Install HRSR ORU onto ELC4 3 June 2010
- ELC4 Testing 29 June - 12 July 2010 (U/R)
- ELC4 Deck To Keel Mate mid July 2010 (U/R)
- ELC4 Closeouts Complete late July 2010 (U/R)
- ELC4 CEIT TBD
- ELC4 ICD Walkdown TBD
- ELC4 Weight and C.G. Measurements late August 2010 (U/R)
- ELC4 Canister Installation late August 2010 (U/R)



# ULF5 Processing Milestones



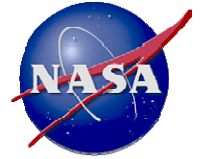
## PMM (All Dates Under Review)

- 19A Landing 18 April 2010
- FM-1 MPLM Return to SSPF 27 April 2010
- PMM External Modifications Start 27 April 2010
- FM-1 MPLM 19A deintegration Complete 17 May 2010
- PMM Standalone Internal Modification “Window” 18 May – 20 May 2010
- PMM Testing Complete 14 June 2010
- PMM Rack Integration Complete 12 July 2010
- CEIT TBD
- PMM Closeouts Complete late August 2010
- PMM ICD Walkdown TBD
- PMM Weight and C.G. Determination late August 2010 \*
- PMM Installation into Canister late August 2010 \*

**\* PMM will not be ready for delivery to the Pad any earlier than the last week of August 2010. Current SSP baseline “payload to Pad” date is 11 August 2010.**



# Issues / Concerns



- **There are multiple threats to the MPLM to PMM conversion/processing campaign:**
  - Recent delay of the STS-131/19A launch (will STS-133/ULF5 launch slip correspondingly?)
  - Potential for further 19A launch delays
  - Potential for an other than KSC 19A landing
  - Significant number of “first time” modification operations to be performed by ASI/TASI
  - Potential for late cargo requirements
  - Workforce changes/turnover

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# **KSC Launch Vehicle Processing**

## **STS-133**

### **FRWG**

**March 1, 2010**

# Agenda

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- KSC Assessment/Orb Multi-Flow S.Stilson / NASA
- Milestone Interface Chart S. Stilson / NASA
- Flight Element Processing W.Bingham / USA



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# Multi Flow

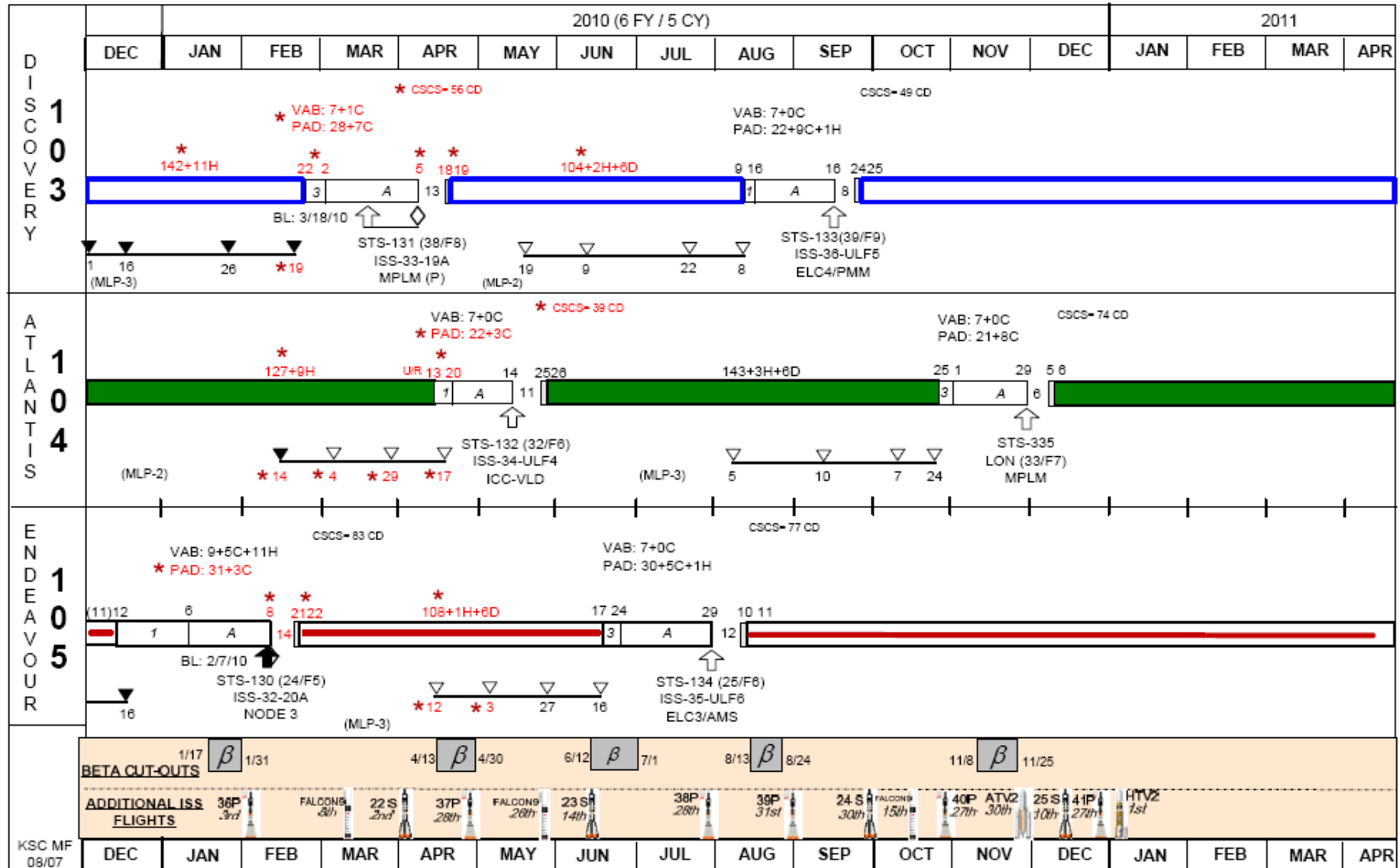
**S.Stilson**

# KSC ASSESSMENT / ORB MULTI-FLOW

## SSP APPROVED MANIFEST

MANIFEST REF. 09B-9

0800 EST, 19 FEB 2010



**LEGEND**

H = HOLIDAY   D = DRYDEN RESERVE   C = PAD CONTINGENCY   Wx = WEATHER OUTAGE   OFF-1   OFF-2   OFF-3   Vehicle out of service   S = SOYUZ   P = PROGRESS  
 CR = CREW REST DAY   DFRC OPS   1/3 VAB OPS   A/B PAD OPS   MILESTONE   LAUNCH   MLP TO VAB / START STACK / ET - SRB MATE / ET - MATE CLOSEOUTS COMPLETE

Contact: S. Wierszalowski, USA Near-Term Manifest Planning (321)861-8701



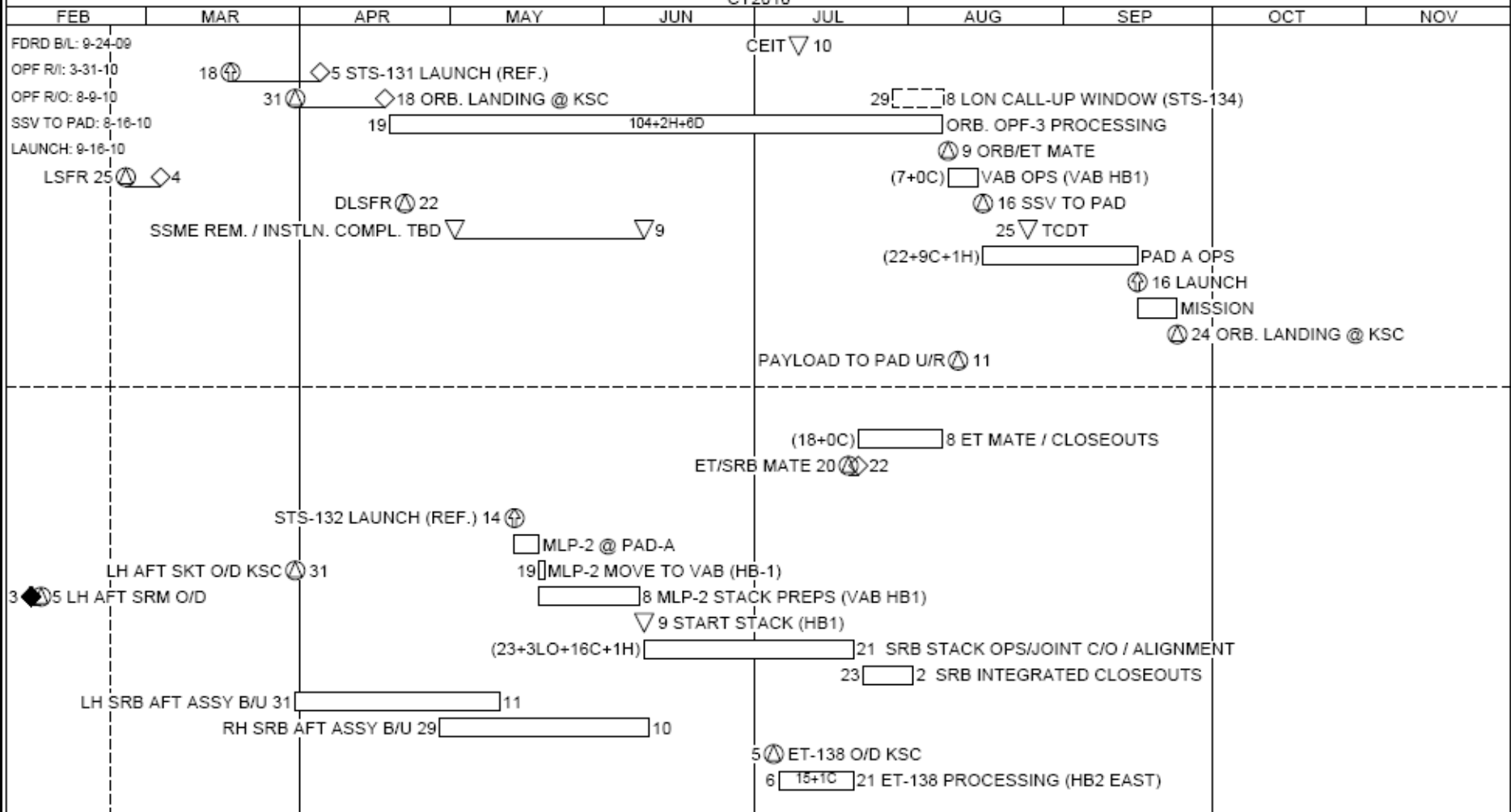
# STS-133 KSC Milestone Interface Chart

OPR: USA - R. GILLETTE, INTEG. OPS.  
NASA - C. FORD, PH-O

OV-103 / 39 / ISS-36-ULF5 / ELC4 - PMM  
CREW / DURATION: 6 Up 6 Dwn / 8  
ET-138 / BI-145 / RSRM 113 / MLP-2 / PAD-A / VAB HB1

SSP APPROVED PROB 9/24/09 (REF. S042013HW)

Status as of:  
02/22/2010  
CY2010



**THREATS:** 1. OPF FLOW DURATION  
2. PMM PAYLOAD DELIVERY TO PAD

**NOTES:** 1. THIRTY-SIXTH ISS/SSP FLIGHT

---

# Flight Element Processing

**W. Bingham**

# Flight Element Processing Overview

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- **Milestone Summary** **To Be Presented**
- **Significant Processing Deltas** **To Be Presented**
- **TPS Status** **To Be Presented**
- **Issues and Concerns** **To Be Presented**

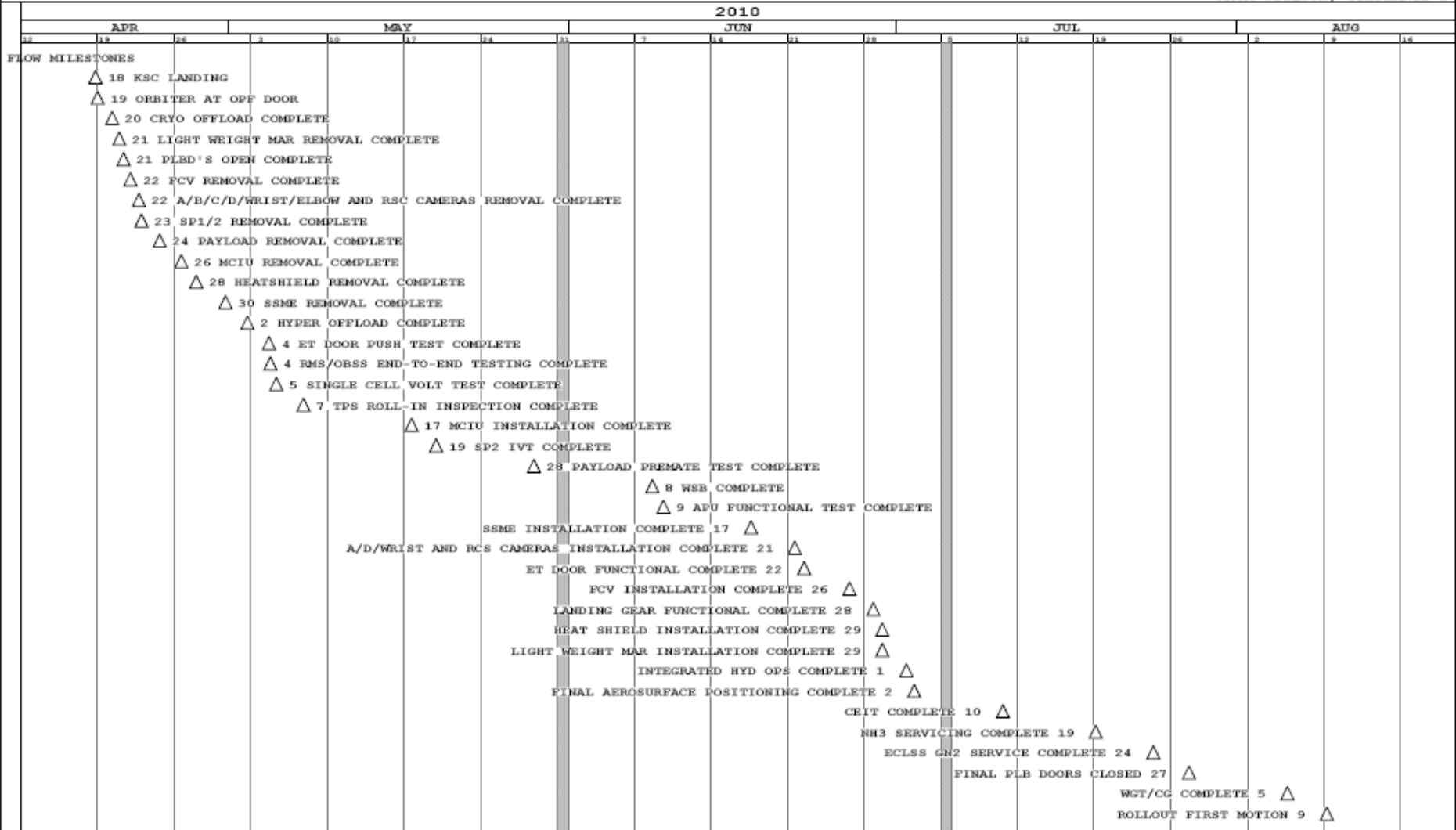
**STATUS**

USA	NASA
C	C
DC:Colwell	DC:McIntosh

**STS-133/OV-103 OFF FLOW MILESTONES**  
 DOWN PAYLOAD: ISS-33-19A UP PAYLOAD: ISS-36-ULF5

Creation Date: 8-DEC-2009  
 Revision Date: 22-FEB-2010  
 Revision : B

OPR: USA-BINGHAM, WAYNE W  
 NASA-STILSON, STEPHANIE S



△ PLAN/BASELINE    ◇ DEVIATION FROM BASELINE    ▲ ◆ ACTIVITY COMPLETED    △ ACTIVITY CANCELED    △-△ ACTIVITY DURATION \*\*\*\* SCHEDULE CHANGE

STATUS DATE: 23-FEB-2010:1    PLOT DATE: 23-FEB-2010, 6.56 am    NETWORK: OPF133.307    CONTACT: SCHUBERT, R.C., 1-0951    OPF BAY-3    EXE: CUSOPFSU.27

# Significant Processing Deltas

---

- Major Component Removal / Replacement
  - 5<sup>TH</sup> PRSD Tank Set Removal
- Will complete remaining “red” OMDP Requirements
- MODS
  - BLT Tile Update
  - Catalytic Coating

# TPS Work Content (STS-133)

---

## Projected TPS Removals

<u>Priority</u>	<u>Description</u>	<u>LSFR</u>
Mand	Deferred Tile/ Fib For 1 Flight (Minimum)	2
Mand	In-Flight Tile/Fib Damage	*40
Mand	Operational Damage (Estimate)	*10
Mand	BLT Mod (1-Trip Tile/1-Cover Tile)	4
Mand	Putty Repairs from Grind-outs	*20
Mand	Additional Putty Removals (Chits)	10
Mand	Corrosion Sampling (Chit J6275A)	5
Mand	Catalytic Coating	2
	<b>Mandatory Total</b>	<b>*93</b>
 <b>Risk Reduction:</b>		
11	ET DOOR STRUCTURE SIDE	24
	<b>Projected TPS Removals TOTAL (Estimate)</b>	<b>*117</b>

**Final TPS Work Content will be presented at the DLSFR**

\* Estimated Number

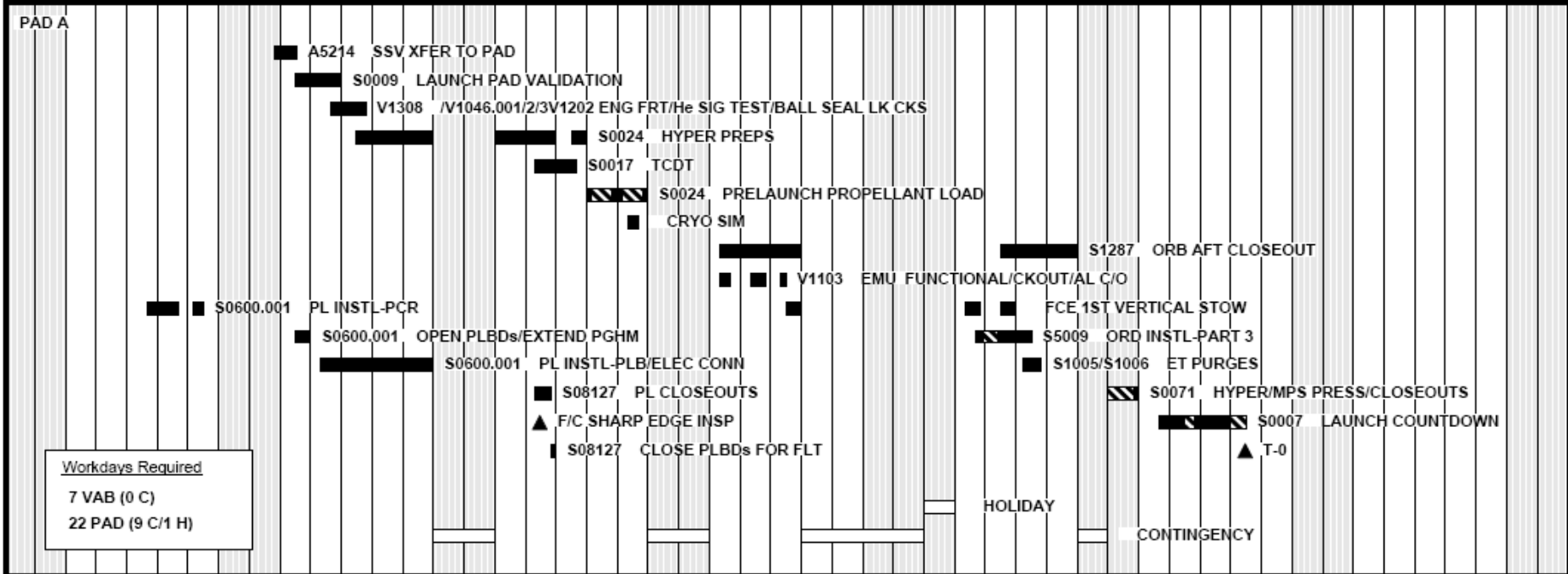
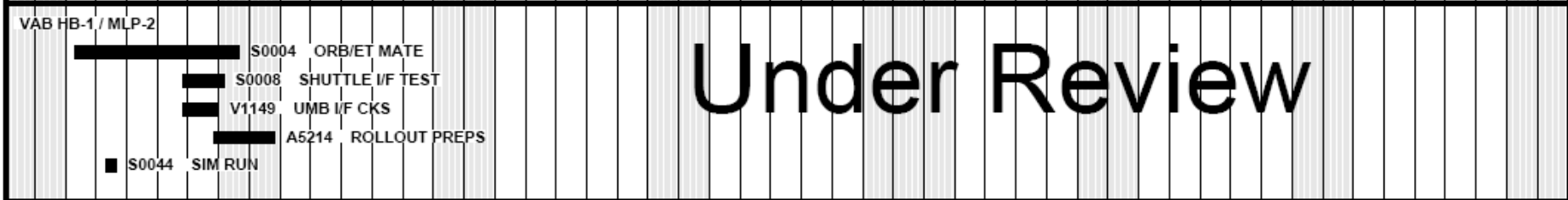
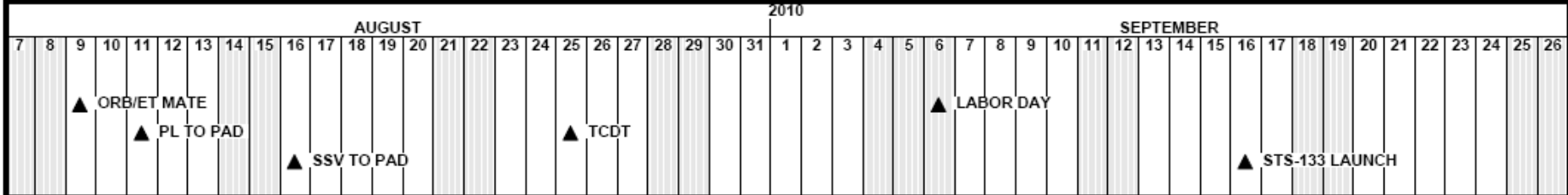
# Issues and Concerns

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- **Flow Control Valves - Hardware Deliverables**
- **AFT Ballast Boxes Removal Decision**

<b>STATUS</b>		OPR: USA - J. Taylor, INTEG FM (1-7420) NASA - S. Stilson, PH-A (1-9103)	
USA	NASA	<b>CONCUR</b>	Creation Date: 11SEP 09 Revision Date: Revision:
C	C		
C=Concur NC=Non-Concur			

**STS-133 / OV-103**  
**Integrated Operations Assessment Summary**  
 Payloads: ISS-36-ULF5 ELC4 - PMM (VERT)







**SPACE SHUTTLE PROGRAM**  
Space Shuttle KSC Integration Office  
NASA Kennedy Space Center, Florida



## STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **03-04-10**

### Backup Material

### FRWG Presentation (With Minor Changes)

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# **STS-133 Flight Requirements Document (FRD) LSFR Status**

**James Flores**

**FRWG 03/01/10**

**PRCB 03/04/10**

# STS-133 FRD Status Update ISS Rendezvous Altitude

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- **STS-133 Latest FRD Revision**

- **Rev 006: Dated, January 25, 2010** (<https://sspweb.jsc.nasa.gov/efrd>)

## Approved CR

- None

## Open CRs

- **FRD17462-133-0012: Update ISS Rendezvous Altitude**  
ECD: 2/18/10

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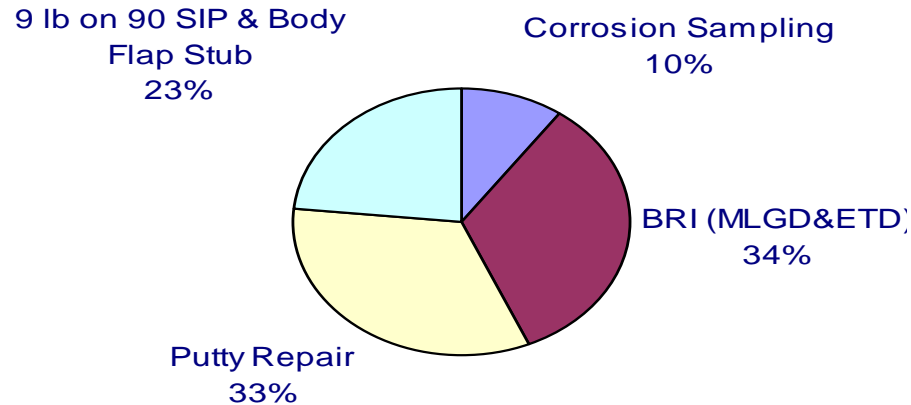
# STS 133 LSFR BACKUP

- Information previously presented at STS-133 LSRR
  - STR/TPS Priorities
  - Potential modifications (info only)
  - Opportunity modifications (info only)
  - STS-133 Weight Saver Mission Kit Changes (Info Only)

# STS-133 Risk Reduction ~ Percentages Shown

---

## TPS Priorities



- Orbiter's expectations for the work areas are shown on the pie chart for STS-133
- Exact numbers are determined by the KSC Team based on vehicle configuration, access, and flow duration
  - Distribution provides data/risk reduction in all areas of the list and does not allocate all the resources in one area
- **Mandatory:**
  - **Flight damage, OMRS Requirements / Chits, LRU access, & deferred work**
    - Corrosion Sampling (10% of total tile allocation) Chit J6275A
    - Putty repairs in RCC & Window DTA Zones (23% with 10 tile min.) Chit Pending
    - Continue G/F R & R on a best effort basis – zones 2B
    - Deferred work may be re-deferred with acceptable inspection

# OV-103 STR/TPS Priorities

---

## Prioritized Opportunity

1 – 10 1 thru 10 complete on OV 103

11. ET Door – Remaining STR side of door & leading edge on door – 40 tiles (24 STR/16 door) – **39 remaining**
12. MLGD – Outboard Aft (1/3 left) 6/door/6 STR)- 24 Tile – **None completed**
13. Nose Area 9lb/90 SIP Upgrade to FRCl-12 – 14\* Tiles (7/side) – (\*103 16 tiles, thruster) – **13 remaining**
14. Base Heat Shield Stinger 9lb/90 SIP Upgrade to AEBT-8 – 42 Tiles (32/stinger, 10/Box Attach point) – **20 remaining**
15. Body Flap Stub “Piano Key” Upgrade to AETB-8 – 40 Tile – **22 remaining**
16. Gap fillers in Subset 2B (Line across MLGD edge) – **3 zones remaining**

# OV-103 STR/TPS Priorities (cont)

---

## 17. BRI-18 Tile – Remaining MLGD (top priority)/ET Door/LESS carrier panels/NLGD

1. MLGD (Inboard forward edge working to AFT door edge) – **None Completed**
2. ET Door – **23 remaining**
3. LESS - panels 8, 9, 10, 7, 6, 5, 4, 3, 2, 1, 11, 12, 13 (in that order) – **60 tiles remaining**
4. NLGD (attrition – do leading edge first) – **104 tiles remaining**

## 18. Mod work (WLE sneak flow, WLE Horsecollar Gap Fillers) – **3 locations remaining**

## 19. MADS Instrumentation Failures (placeholder)

## 20. Remaining Gap Fillers & Window BRI-18 - **121 remaining**

Windows 2, 3, 4, & 5 Upper Carrier Panels (top priority)

# STR/TPS Priorities Current Vehicle Status

STATUS AS OF 1-08-2010

Priority Number	Total	OV-103	OV-104	OV-105
1. BRI-18 Tile - MLGD FWD O/B Corner	28	complete	complete	complete
2. BRI-18 Tile - MLGD FWD Edge	22	complete	complete	complete
3. BRI-18 Tile - MLGD O/B Side	18	complete	complete	complete
4. BRI-18 Tile - STR side of ET Doors	20	complete	complete	complete
5. BRI-18 Tile – LESS Carrier Panels 8-10 (103 & 104)	24	complete	complete	n/a
6. BRI-18 Tile – STR side of ET Doors I/B	8	complete	complete	complete
7. Inboard Elevon "Hub" Tile Mod	4	complete	2	complete
8. I/B Elevon 9lb/90 SIP	34	complete	complete	complete
9. O/B Elevon 9lb/90 SIP	6	complete	complete	complete
10. MLGD – Outboard Middle 1/3	24	complete	complete	complete
11. ET Door remaining STR side	40	1	10	0
12. MLGD - Outboard AFT 1/3	22	0	0	9
13. Nose Area 9lb/90 SIP	14 (16 <sup>OV103</sup> )	3	complete	7
14. Base Heat Shield 9lb/90 SIP	42	22	complete	complete
15. Body Flap Stub "Piano Key" tiles	40	18	20	18
16. Gap fillers in Subset 2B	5 Zones	2	1	0
17. Remaining BRI-18 - MLGD (top priority) / ET / LESS carrier panels / NLGD	MLGD 100	MLGD 0	MLGD 1	MLGD 0
	NLGD 123	NLGD 19	NLGD 22	NLGD 52
	LESS 68 (92 <sup>OV-105</sup> )	LESS 8	LESS 10	LESS 22
	ET Door 28	ET Door 5	ET Door 4	ET Door 1
18. Mod work LESS internal	44 locations	41	complete	complete
20. Remaining Gap Fillers & Window BRI-18	124	3	2	19





# STS-133 Potential Mods previously presented

---

- **TAD 30091 BLT FE DTO Flight 4**
  - Re-flight of protuberance tile and associated thermocouple instrumentation
  - Potential for protuberance height increase from the 0.35” height being flown on STS-131 – pending evaluation and analysis of STS-131 performance flight data
- **TAD 30246 Catalytic Coating DTO Flight 3**
  - Re-flight of catalytic coating applied to one tile in BLT DTO region of influence
  - Would require shelf life extension of existing lot of catalytic coating material or production of new lot of catalytic coating (age life limited) and reapplication to selected tile

# STS-133 Opportunity Mods previously presented

---

- **19735 WLE Spar “Sneak Flow” Protection**
  - Increases RCC panel damage tolerance by adding a flow restrictor to limit allowable plume flow to 50% across the flow restrictor
  - Mod completed at all panel locations with the exception of LH panels 2-4.
- **19763 Lower WLE Carrier Panel Horse Collar Gap Filler Redesign,**
  - Redesigns the lower WLE access carrier panel horse collar gap fillers with an enhanced design with additional sleeving
  - Mod completed at all panel locations with the exception of LH panels 2-4
- **23227 Connector Saver (ME414-0630) Redesign (OMS Pod, Ku Band)**
  - Connector Saver mod provides proper interfacial seal and wavy washer engagement retention force to reduce risk of inadvertent demate during use.
  - Only Left POD and KU band locations remain to be worked

# STS-133 Weight Saver Mission Kit Changes (Info Only)

---

## Changes currently authorized by STS-133 FRD NSTS 17462-133:

- **Removal of 5<sup>th</sup> PRSD Tank Set**
  - Tech order configuration updates incorporated in MECSLSI
- **Aft Winch Removal**
  - Currently removed for STS-131 to provide payload clearance
  - Removal tech order configuration **incorporated in** MECSLSI
- **Aft Bulkhead Wireless Video System Antenna Removal**
  - Currently removed for STS-131 to provide payload clearance
  - Antenna coverage assessment complete; antenna will remain off for STS-133
  - Removal tech order configuration **incorporated in** MECSLSI

## Potential change under evaluation:

- **Aft Ballast Boxes Removal (LSFR update: Boxes will not be removed)**
  - ~~Not currently authorized by FRD – IPT decision regarding weight savings need versus processing effort to remove hardware (low potential due to forward CG)~~
  - ~~FRD authorization required to implement tech order configuration change to MECSLSI~~

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# **STS-133**

## **Launch Site Flow Review**

### **Flight Software Overview**

**Tom Stansel**

**USA FSW**

**PRCB 03/04/2010**

# STS-133 LSFR (FSW)

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- **STS-133/OV-103 Flight Software (FSW) Versions**
  - Seventh scheduled flight of Operational Increment (OI) 34 Flight Software (SASCB SCR 98107A documents PASS and BFS OI-34 content)
  - Fifth scheduled flight of MEDS IDP VI 07.01/Seventh scheduled flight of MDUF VI 06.00 (SASCB SCR 98113A documents content)
  - Eighth scheduled flight of MAGRS-3S Link 613-996-008 Software (Link-008) (SASCB SCR 98115 documents content)
- **STS-133/OV-103 Flight Software Payload Support:**
  - ISS ULF5
  - Orbiter Interface Unit (OIU)
  - Orbiter Docking System (ODS)
  - Sequential Still Video (SSV)
  - Payload Power Switching Unit (PPSU)
  - Trajectory Control System (TCS)
  - ISS Caution and Warning (ISSCW)
  - Permanent Multipurpose Module (PMM)
  - Assembly Power Converter Units (APCUs) & Station to Shuttle Power Transfer System (SSPTS) (generic support for both configurations)
- **Major New Flight Software Support Items:**
  - None

# STS-133 LSFR (FSW)

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- **STS-133 Source Changes/Edits for Primary Flight Software (Base)**
  - **SCR 93211A Update of SSMEC Vehicle Data Table (VDT) for Enhanced Accelerometer Operations**
  - **SCR 93262A Film ET Camera**
  - **SCR 93267A Removal of the Set and Reset to False Cmds For the RCS Tank Iso Valves**
  - **SCR 93284 Update PASS HUD Body Flap Warning Limit K-Load**
  - **DR 126366 SM GPC Failure to Send GCIL Commands**
- **STS-133 Patch Implementation for Primary Flight Software**
  - **None.**
- **STS-133 Patch/Edit Implementation for Backup Flight Software (Base) (included on delivered Mass Memory)**
  - **SCR 93282 Update PASS/BFS HUD Body Flap Warning Limit K-Loads**
- **STS-133 Patch Implementation for Backup Flight Software**
  - **None**

# STS-133 LSFR (FSW)

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- **Products**

- **STS-133/OV103 Base delivery schedule (available to field)**

**FPSB**

- **Shuttle Data Tape**

**February 22, 2010 Actual**

- **Mass Memory Unit**

**March 18, 2010**

- **An STS-133/OV103 ADTL SDT/Mass Memory is not planned**

- **Open Items**

- **None**

- **Concerns/Issues**

- **No issues or concerns with STS-133 at this time**



# **EVA Status STS-133/ULF5 PRCB**

**David Foltz  
EVA Office  
Johnson Space Center  
March 4, 2010**



- **Forward Bulkhead PFR**
  - Portable Foot Restraint, SED33105308-307 installed on forward bulkhead.
  - Released T.O. M072-661568-029
  - Required to protect for contingency EVA TPS inspection
- **Lightweight Starboard TSA**
  - Starboard LWTSA installation – Tech Order: M072-660850-006
  - Starboard LWTSA Tools installation – Tech Order: M072-660858-001
- **No Port TSA**
- **Winches**
  - Winch P/N SED33101570-327 on Forward Bulkhead
  - Winch P/N SED33101570-325 on Aft Bulkhead

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**STS-133**  
**ISS – ULF5 PMM, ELC4**

**Launch Site Flow Review**

**Payload Cargo Engineering Status**

**ABBAS ELSABAGH**

**281.212.6186**

**03-04-2010**

# STS-133 LSFR

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## Engineering Flight Product Status

<u>Drawing No</u>	<u>Title</u>	<u>Released</u>
V072-200213	MECSLSI	02/18/09
VA72-200213	Cargo Arrangement	11/18/09
VD72-200213	Avionics Diagram	02/18/09
VS72-200213	Integrated Schematic	02/18/09
VS70-540423	Retention Schematic	02/11/09
– FRED released on 02-19-10		

## Engineering Open Work

- VA Drawing release ECD: 04/09/2010
  - Waiting on PMM model ECD: 03/02/2010

## Standardization

- Configuration Waiver S070045 dated 9/21/09 to Orbiter/Payload Integration Standardization Document NSTS 60523. This is required to add the PPSU and to direct the Software to support it.
  - PPSU was removed from flight when ELC4 power requirement was deleted
  - No change to Software, due to late requirement change - Waiver is still applicable

# STS-133 LSFR

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## ICD Status (\* = Impact Flight Products)

<u>Document</u>	<u>Title</u>	<u>ECD</u>	<u>Status</u>
ICD-A-21403-ELC4A	ELC4		Baselined
Forward Work:	Thermal properties/reports; Structural compatibility/reports; Incorporate 01/22/10 CAD model w/associated non-compliances*; Incorporate final DPA measurements*		
ICD-A-21449-MPLMA	MPLM (PMM)		Baselined
- A05774	Update Grapple Fixture Figures	03/05/10	In Review
- A05793	Add non-compliances	03/15/10	In Review
- A05840	Attach point compatibility	03/29/10	In review
Forward Work:	Structural/Stress reports; Thermal properties/reports; Update per PMM CAD model*		

## Issues/Concerns

- PMM configuration changes, late CAD model delivery - ICD impacts unknown

# STS-133 LSFR

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## Cargo Close Clearance Process

- The following Close Clearance areas have been identified:
  1. ELC aft port and starboard scuff plate to MPM
  2. PMM to top centerline latches
  3. ASI flag (PMM) to sidewall
- A Chit will be developed to take Close Clearance Measurements of item 1 above
  - Other locations already measured or not accessible for as-installed measurements
- Chit measurements will be performed at the (PAD) after payload installation
- A Chit will be developed to measure the ELC4 longeron latch centerline locations to set-up CEWS for ELC MGSE installation (similar to STS-129/ULF3)
  - Same chit will also measure the ELC4 keel 'droop' when it arrives at the PAD prior to payload installation

## Backup

# STS-133 LSFR

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## OMRSD

- **FII V2 Payload (Post-Mate)**

  - Baselined Files

    - P350 MPLM Core Requirement (Permanent Multi-Purpose Module (PMM))

    - RCNs

      - PP18135R1

      - P554 – ISS-ULF5 (Baseline)

      - ECD

      - 03/05/10

      - PP18177R2

      - P350 – Core MPLM (PMM) Update

      - 03/05/10

- **FII V4 (Pre-Mate)**

  - RCNs

    - PS18163 Mission-Unique List

    - Release

      - 03/19/10

    - Baseline

      - 04/02/10

    - PS18164 FIII MUL

      - 03/19/10

      - 04/02/10

    - PS TBD Adjacent Pin Test

      - 03/19/10

      - 04/02/10

- **FII V6 (Shuttle Experiments)**

  - XDT701A TriDAR

  - RCN

    - None

## Issues / Concerns

- None

# STS-133 LSFR

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## Annex 1: ISS-ULF5-NSTS 21554-A01: Baselined on 11/12/09

### L-4 M Update

### ECD

- Customer submittal 04/23/10
  - Data needed: Weight and Mass Properties Update & Drawing Releases
- CR approval 05/14/10

### L-1 M Update

- Customer Submittal 07/23/10
  - Data needed: Weight and Mass Properties
- CR Approval 08/16/10
- Final weight log 08/23/10

### •Issues/Concerns

- None



# STS-133 LSFR

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## Time-Critical Ground Handling Requirements

- | <b>Activity</b>             | <b><u>ECD</u></b> |
|-----------------------------|-------------------|
| • Customer Submittal (L-4M) | 05/17/10          |
| • Release for review (L-3M) | 06/16/10          |
| • Baseline (L-60 Days)      | 07/16/10          |
| • Issues / Concerns         |                   |
| • None                      |                   |

# STS-133 LSFR

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## Payload Integration Hardware Open Work

ECD

- **Cargo Integration Hardware Allocation Assessment**
  - **CIR Assessment**
    - **Bridge & Latch Allocation** **No Issues**
  - **FRED Assessment** **02/12/10A**
  - **On-going assessment of Engineering releases**
- **New Build Hardware**
  - **Crows Foot – V826-340001-005 (New)** **04/18/10**
  - **Extended Fitting – V826-340003-003 (New)** **04/18/10**
- **Issues / Concerns**
  - **None**



## STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **02-25-10**

### Backup Material

- **SSP Systems Drawings** **Attachment 1**
- **SSP Authorized Modifications/Non-Standard Work** **Attachment 2**
- **SSP OMRS Waivers and Exceptions** **Attachment 3**
- **Launch Window** **Attachment 4**
- **Open Configuration Waivers** **Attachment 5**



## STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **02-25-10**

### Overview

- **SSP System Drawings** **No Issues\***
- **SSP Authorized Modifications/Non Standard Work** **No Issues\***
- **SSP OMRS Changes (RCNs)** **No Issues\***

\* Backup material included



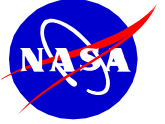
<b>STS-133 Launch Site Flow Review</b>	<b>Presenter</b> <b>MK-SIO / A. Swift</b>	
	<b>Date</b> <b>3-4-10</b>	<b>Page</b> <b>1</b>

**Mandatory RCNs:**

**NONE**

**Non-Mandatory Value Added RCNs:**

**NONE**



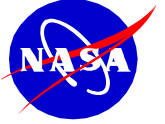
<b>STS-133 LSFR</b> <b>Flight Crew Equipment/GFE</b>	Presenter <b>MV6/Tom Goebel</b>	
	Date Mar 4, 2010	Page 1

# **STS-133 LSFR**

## **FCE/GFE Status**

**Kenneth Brown**  
**Manager, GFE and Flight Crew Equipment Office**  
**Johnson Space Center**

# **BACKUP**

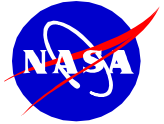


<b>STS-133 LSFR</b> <b>Flight Crew Equipment/GFE</b>		Presenter <b>MV6/Tom Goebel</b>	
		Date Mar 4, 2010	Page 2

- **All GFE hardware need dates and delivery dates were partnered at CIR**
- **Tech orders and hardware list noted in following 2 charts**



**SPACE SHUTTLE PROGRAM**  
**Space Shuttle Orbiter Project Office**  
 NASA Johnson Space Center, Houston, Texas



**STS-133 LSFR**  
**Flight Crew Equipment/GFE**

Presenter <b>MV6/Tom Goebel</b>	
Date Mar 4, 2010	Page 3

Tech Order numbers are identified for reference only. Report generated 3/17/10.

Hardware	Tech Order	KSC Eng Need	Eng(TO) Release	In MEC	Cert O/C	KSC Need	JSC Planned	Comments	JSC Contact
CTVC A (port forward)	M072-750025-072	5/5/2010	1/7/2005	11/13/2009	C	6/5/2010	6/5/2010	OPF Installation Desirable. Assembly from STS-132.	Randall Moore
ITVC B (port aft)	M072-750025-073	5/5/2010	1/7/2005	11/13/2009	C	6/5/2010	6/5/2010	OPF Instl for testing. PAD Installation. Assembly from STS-132.	Randall Moore
CTVC C (starboard aft)	M072-750025-074	5/5/2010	1/7/2005	11/13/2009	C	6/5/2010	6/5/2010	OPF Instl for testing. Pad Installation. Assembly from STS-132.	Randall Moore
CTVC D (starboard forward)	M072-750025-075	5/5/2010	1/7/2005	11/13/2009	C	6/5/2010	6/5/2010	OPF Installation Desirable. Assembly from STS-132.	Randall Moore
SRMS elbow camera	M072-544504-013	5/5/2010	3/3/2008	11/13/2009	C	6/5/2010	6/5/2010	OPF Instl for testing. Pad Instl for flight. Assembly from STS-132.	Randall Moore
SRMS wrist camera	M072-544504-006	5/5/2010	3/3/2008	11/13/2009	C	6/5/2010	6/5/2010	OPF Installation Desirable. Assembly from STS-132.	Randall Moore
Centerline Airlock Camera (stowed)	M072-660828-002, plus CCCD stow		3/17/1999	11/13/2009	C			OPF Installation mandatory for alignment. Assembly from STS-132.	Randall Moore
Lefthand Umbilical Camera (aft)	M072-705001-016	7/2/2010	10/28/2004	11/13/2009	C	8/2/2010	8/2/2010	VAB installation mandatory.	Randall Moore
Righthand Umbilical Camera	M072-705001-028 M072-705001-027	7/10/2010	10/28/2004 10/28/2004	11/13/2009	C	8/2/2010	8/2/2010	VAB installation mandatory.	Randall Moore
Digital Television (DTV)	M072-710570-007		11/15/2007		C			Installed Hardware.	Larry Schmidt
MCIU/RMS Situational Awareness Display (RSAD)	M072-710543-001		3/7/2000	11/13/2009	C			Installed Hardware.	Larry Schmidt
Tools for Rendezvous and Docking (TRAD)	M072-730021-019		7/20/2007	11/13/2009	C			Installed Hardware. Time Life Cycle is expired. Waiver in work (ECD:3/2/10)	Larry Schmidt





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**Space Shuttle Orbiter Project Office**  
 NASA Johnson Space Center, Houston, Texas



**STS-133 LSFR**  
**Flight Crew Equipment/GFE**

Presenter <b>MV6/Tom Goebel</b>	
Date Mar 4, 2010	Page 4

Tech Order numbers are identified for reference only. Report generated 3/17/10.

Hardware	Tech Order	KSC Eng Need	Eng(TO) Release	In MEC	Cert O/C	KSC Need	JSC Planned	Comments	JSC Contact
Video Processing Unit (VPU)	M072-710338-007		3/2/2008		C			Installed Hardware.	Larry Schmidt
Wireless Video System (WVS)	M072-344828-001 mount M072-744007-001 UHF M072-744004-012 S-BAND M072-744004-013 S-BAND M072-744004-014 S-BAND M072-744004-016 S-BAND M072-744004-017 S-BAND M072-744004-018 S-BAND	3/24/2010	8/24/2004 6/2/2004 3/21/2008 3/21/2008 3/21/2008 3/21/2008 3/21/2008 3/21/2008	11/13/2009	C	4/24/2010			Randall Moore
Space to Space Orbiter Radio (SSOR)	M072-344828-002 M072-740828-002 Harness		9/24/2004	11/13/2009	C			Installed Hardware.	Larry Schmidt
RMS Sideview Camera (RSC)	M072-710281-002 M072-000416-006 camera	7/9/2010	11/24/2004	11/13/2009	C	8/9/2010	8/9/2010	Pad instl only. No OPF testing required. Assembly from STS-132 after return to JSC for repressurization.	Randall Moore
OBSS Sensor Package 1	M072-710282-008	5/5/2010	4/18/2008	11/13/2009	C	6/5/2010	6/5/2010	Unit from STS-132.	Russell Yates
TriDAR	M072-730021-021				C			Installed Hardware.	Larry Schmidt
OBSS Sensor Package 2	M072-710282-006		4/18/2008	11/13/2009	C			Unit from STS-131.	Larry Schmidt



## STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **03-04-10**

### SSP System Drawings

The Drawings Baseline Was Released By PRCB S115133 on 01-26-10

- V072-000001-290 (Rev. WH) Space Shuttle System (Rel. 02-11-10)
  - V072-200213-001 (**Rev. A**) Mission Equipment Cargo Support (**Rel. 02-18-10**)
  - SGD32104456-301 (Rev. TBD) Crew Compartment Configuration (Rel. TBD)
    - 302 Descent
  - V070-000001-003 Orbiter General Assembly
    - V070-410100-017 SSME Installation
  - 10100-0061-182 Integrated SRB General Assembly (BI-145)
  - 80901000000-530 External Tank Assembly (ET-138)
  
- STS-133 LSRR + 18 days Mission Configuration Product Plan (MCP) was last published on 02-15-10 and will be republished at ORR - 14 days on TBD.



## STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **03-04-10**

### SSP System Drawings – (Continued)

#### Ferry Configuration

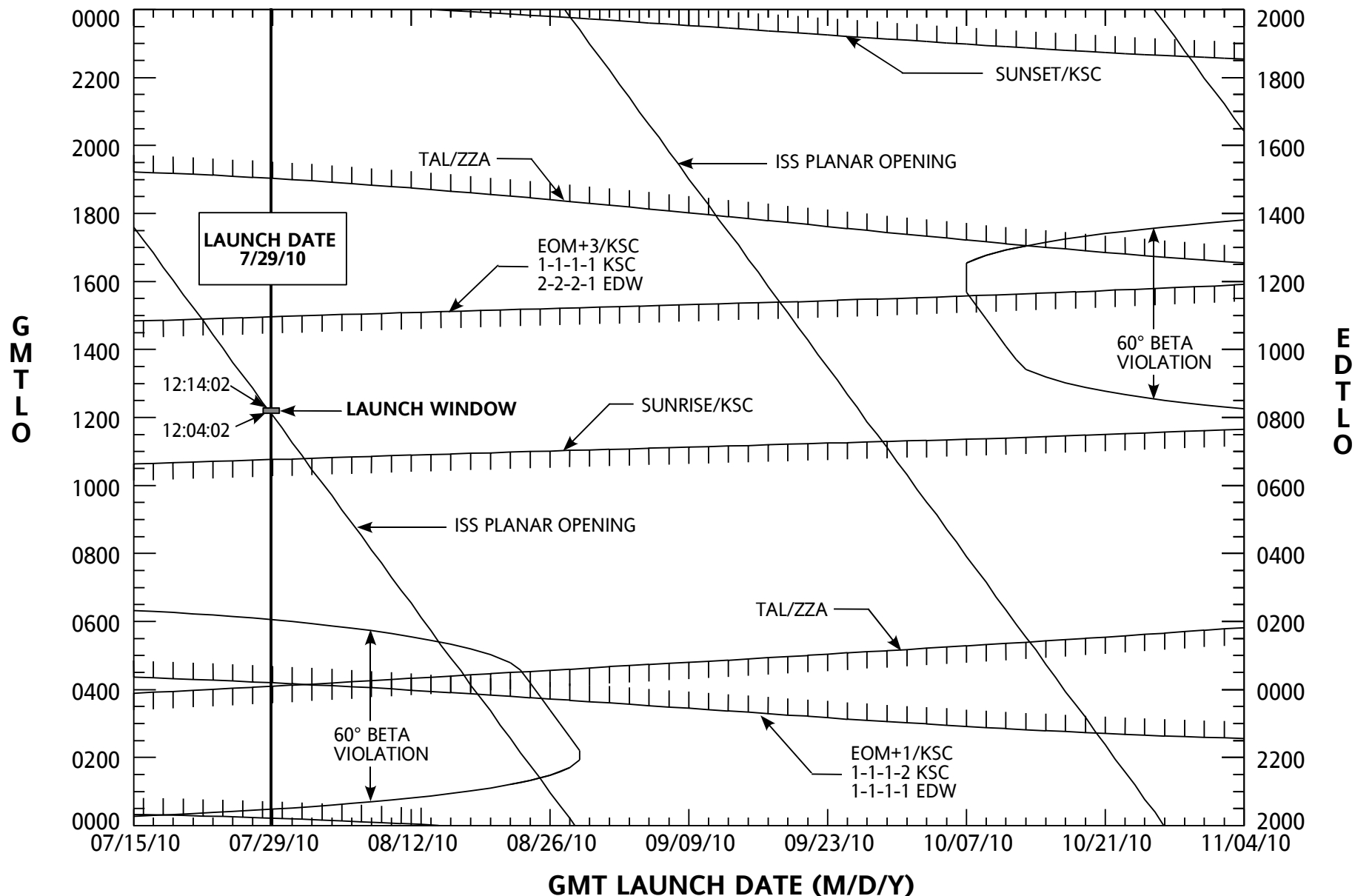
- V072-000001-291 (Rev. WH) Space Shuttle System Drawing (Rel. 02-11-10)
  - V072-200213-002 (**Rev. A**) Mission Equipment Cargo Support (**Rel. 01-18-10**)
  - SGD321004456-001 (Rev. TBD) Crew Compartment Configuration (Rel. TBD)
  - V072-300055-015 (Rev. BU) Ferry Flight Configuration (Rel. 05-11-09)

SCA 911

Mission Duration = 10+1+2  
 Inclination = 51.6°  
 OMS2 ha/hp = 124 x 85 nmi.  
 Target ha/hp = 208 x 202 nmi.

## STS-133 OCF LAUNCH WINDOW

C. Osgood/USH-483L  
 M. Jamroz/USH-483L  
 September 22, 2009



Note: EOM lighting lines, based on an OMS2 phase angle of 251 deg, are representative only.  
 The ISS beta angle ( $|\beta| < 60^\circ$ ) for mated operation begins ~ 2/19:52:00 MET (FD4 Rendezvous) and ends ~ 8/13:52 MET.

LW MAR  
8929-324

CDR STEVE LINDSEY  
PLT ERIC BOE  
M/S #1 TIMOTHY KOPRA  
M/S #2 MICHAEL BARRAT  
M/S #3 NICOLE STOTT  
M/S #4 ALVIN DREW

# MODULAR LOCKER LAYOUT ASCENT

PANTRY FOOD	1622 -308	MF57A	1622 -308	PANTRY FOOD	1622 -302
-------------	--------------	-------	--------------	-------------	--------------

LEADER: DANIEL CULPS  
DATE: 02-19-10  
LAUNCH: 09-16-10  
FLIGHT: STS-133/ULF5  
VEHICLE: OV-103  
CREW: 6 MAN 8 + 1 + 2 DAYS  
RQMTS: SRMS, ERGOMETER,  
SORG, NO RCRS,  
SLEEPING BAGS

MD CEIL (PORT 1) TBD  
ISS RESERVE  
MD CEIL (PORT 2) 0654  
-301

ML60B 6013  
-310  
PRIME C/L CAM  
GFE TV CONTROL  
ML60E TBD  
-XXX  
PGSC ACCESS  
ML60M 6014  
-312  
B/U C/L CAM  
LEAK DETECTOR

## MIDDECK FORWARD

MF14E 2760 -306 FRESH FOOD FRESH FOOD	MF28E 0644 -301 GLACIER
MF14G 2761 -308 FRESH FOOD MENU FOOD	MF28H 0655 -301 IFM BREAKOUT BOX ALTIMETER
MF14H 2763 -304 MENU FOOD MENU FOOD	MF28K 0656 -301 IFM TOOLS
MF14K 2764 -306 MENU FOOD MENU FOOD	MF28M TBD SOMS AMMONIA KIT
MF14M 2765 -304 MENU FOOD MENU FOOD	MF28O 9014 -314 MED KITS MAK(1)
MF14O 2766 -305 MENU FOOD	

MF43C 1900 -309 M/S #4 CLOTHING	MF57C 8072 -302 M/S #2 CLOTHING	MF71C 3005 -305 M/S #3 CLOTHING
MF43E 0644 -301 SSP RESERVE	MF57E 0644 -301 CHeCS	MF71E 0645 -301 CGBA NLP CELLS
MF43G 1902 -309 CDR CLOTHING	MF57G 8073 -302 PLT CLOTHING	MF71G 1903 -306 M/S #1 CLOTHING
MF43H 1901 -306 POST INSERTION	MF57H 0645 -301 ORBITER FDF	MF71H 0645 -301 CREW CARE PKG   ENTRY GMTS
MF43K 0641 -301 AEM MOUSE IMMUNOLOGY2	MF57K 0642 -302 FDF	MF71K 0643 -303 AEM MOUSE IMMUNOLOGY2
MF43M 0641 -301 AEM MUFFLERS (2)	MF57M 0642 -302 SODF	MF71M 8965 -311 CONDENSATE COLL SUPA(14) INGRESS HDWR O-RING/BRAYCOTE STS CSA-CP
MF43O 0642 -302 HYGIENE	MF57O 6687 -326 HH LIDAR W/ NIGHTSCOPE 2ND HHL (TRAD)/SSV BPSMU	MF71O 6299 -318 COAS/FLUOR LT SHIELDS/DCS 760 AUDIO DOSIMETER BTA

## MIDDECK AFT

MA9D/F TRAD SPARE DTV MUX SPARE DTV DSR SPARE DTV VIP	MA16D 0644 -301 ISS RESERVE
MA9G 6066 -334 COLOR PRINTER	MA16F 0645 -302 SSP RESERVE
MA9J 6299 -307 PRINTER TRAYS IODINE REMOVAL 6256-303	MA16G 8723 -302 PHOTO/TV STOW-N-GO
MA9L 7432-317 SOFT STWG BAGS PHK'S (6) 4980-309 CCK/LIGHT STICKS/COMM PHK 8071-312 RSTRNTS/FLUID LOAD 8070-302 FIBERSCOPE	MA16H 8733 -310 RCC BAG ASSY

MD CEIL (STBD 1) 0718  
-305  
RCC REPAIR  
TILE REPAIR  
MD CEIL (STBD 2) 6665  
-343

MD FLOOR (PORT 2) 0637  
-TBD

MD FLOOR (PORT 1) TBD  
ANTIMICROB APP/GLOVES  
H2 SENSORS (2)  
SAMPLE PURGE KIT  
SILVER BIOCIDES KIT (2)  
MINERAL SYRINGE KIT  
CWC

MD FLOOR (STBD 2) TBD  
1 MLE (IPT RESERVE)  
ISS HDW

MD FLOOR (STBD 1) 0657  
-TBD  
ISS HDW  
EVA/EMU HDW

VOL B 7436  
(MA73J)  
-TBD  
INSTALLED  
VOL 3B 7425  
(MA73J)  
-320  
QUICK DON  
MASKS(2)/CABIN AIR  
CLEANER/AUD.DOS.  
BTA/LCD MONITOR/  
DCS 760 CAM/SPOT-  
LIGHT/400MM LENS/  
PD100 CAMCDR/FLASH  
28-70MM LENS

A17 7424  
-304  
CORE CC SYS BAG  
DTV CAMERA BAG  
QUICK DON MASK (4)  
HATCH TOOL  
VOLUME D (MD52C)  
NOT INSTALLED

VOLUME F 1403  
(MD76M)  
-306  
WET TRASH

VOLUME G 1800  
(MDBOR)  
-346  
CONT UCDS  
WASTE MGMT

VOLUME H 8068  
(MD29R)  
-310  
EVA ACCESS  
(INBD)  
EVA ACCESS  
(OBD) 8065  
-308

WMC 4575  
-315 (MA82H) 0914  
-332  
TOWELS AND  
RESUPPLY ITEMS  
WMC DISPENSER  
1st DAY CLOTH  
SUPA  
1641-330

EXT AIRLOCK 5557  
-319 (STBD) 2-EMUs (PORT) 5555  
-320  
EXT A/L FLOOR (PORT)  
SAFER  
EVA/EMU

55 LIOH- 29 + 1 ATCO IN LIOH BOX, 2 INSTLD  
(7435-320)  
7 STOWED PORT FLOOR 1

WINDOW SHADE BAG - WINDOW SHADES  
(5548-352)  
IFM CABLES & HOSES (4259-343)  
MONITOR SHIELDS

L10A1: AVIU (6686-331)  
L10A2: DTV MUX  
L10A3: DTV VTR/MP  
L11: PDIP 2 OIU 1/2  
L12A1: SSP 1  
L12A2: SSP 2  
L12A3: PDIP 1  
R12A1: VPU  
R12A2: OBSS/OPP

\* NOT APPROVED  
● LATE LOAD  
⊗ SWAP  
⊗ TRANSFER TO ISS  
CTB-CARGO TRANSFER BAG  
HCTB-HALF CARGO TRANSFER BAG

C/D JSC TBD  
P/D JSC TBD  
C/D KSC TBD  
P/D KSC TBD  
CEIT KIT TBD  
MDK LBL TBD  
DWG NO. SGD32104442  
/USR/DWGS/LOCKER/STS119  
CCMM: T. HUNT 483-3063

NOTE: LOCKER LAYOUTS ARE FOR REFERENCE ONLY AND ARE NOT RELEASED DRAWINGS. FOR RELEASED DRAWINGS, REFER TO CCCD DRAWING # SGD32104442



# STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **02-25-10**

## Modification Impact Report

- **Mission Equipment Modifications and Orbiter Modifications analyzed for impacts to OMRSD, LCC, ICD, EMI, Software, and GSE.**
- **A total of 2 MCRs have been approved and/or pending mods**
- **Current MCR impact status:**
  - **No impacts for all six disciplines** **2**
  - **One or more disciplines with impacts, documentation approved and/or pending approval** **0**



## STS-133 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **02-25-10**

### Modification Impact Report – (Continued)

- Possible impacts still under review

**0**

1MRCS REPT. 4650-1  
PAGE NO. 1

SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0133

ORB

ECP-MCR/KIT SEQUENCE

RUN TIME

06:26 DATE 02/24/2010

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRIO	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
ORB-0090B	AUTH	J6163	0103 002	OV-103 BODY FLAP PDU GEARBOX FLUID LEVEL INSPECTION
2007-01-30	MAND			
	KSC		SPAR	
	039			
S-J6275A	AUTH	J6275A	0103 004	ORBITER STRUCTURE IML SURFACE CORROSION SAMPLING INSPECTION
2008-02-26	MAND			
	KSC		SPAR	CORROSION SAMPLING CAPABILITIES WILL BE PROJECTED AT LSFR,
	039			AND FINALIZED AT DLSFR FOR EACH FLOW.
S-J6526	AUTH	J6526	0103 001	EVALUATION OF OMS POD LI-900 TILE INSTALLED ON 0.090" SIP
2009-07-01	MAND			
	KSC		SPAR	EFFECTIVITY: OV-103, FLT. 39
	039			
S-J6531	AUTH	J6531	0103 002	METRIS SCAN OF OV-103 LOWER SURFACE
2009-06-26	MAND			
	KSC		SPAR	OV-103, FLT. 39
	039			
S-J6534	AUTH	J6534	0103 001	PUTTY REPAIR TILE REPLACEMENT FOR RISK REDUCTION
2009-07-29	MAND			
	KSC		SPAR	EFFECTIVITY: OV-103, FLTS 38 & 29
	039			
S-J6543	AUTH	J6543	0103 002	ET FERRY FLIGHT DOOR ATTACH FITTING INSPECTION
2009-09-17	MAND			
	KSC		SPAR	NDE OF FERRY FLT DOOR ATTACH FITTINGS WILL ONLY BE REQ'D
	039			FOLLOWING A F/FLT BACK TO KSC. F/FLT ONLY.



S-J6577	AUTH J6577 MAND KSC 039	2010-01-29	0103 000	AMES GAP FILLER REMOVAL AND REPLACEMENT
			SPAR	GAP FILLER REPLACEMENTS WILL BE PERF'D OVER REMAIN ING MANIFESTED FLTS BASED ON PROG LSFR PRIORITIES.
S-J6578	AUTH J6578 MAND KSC 039	2009-12-14	0103 000	CAPTURE OV-103 OUTPUT WAVEFORMS TO ADDRESS 1N3600 DIODE CON-
			SPAR	CERNS
S-J6585	AUTH J6585 MAND KSC 039	2010-01-14	0103 001	OPTIGO AND Z-SCAN OF BLT PROTUBERANCE TILE
			SPAR	BLT TPS SCAN HAS BEEN INTEGR'D INTO & IS ACCOMMODA TED BY CURRENT STS-131/STS-133 OPF PROCESS'G PLANS
S-J6587	AUTH J6587 MAND KSC 039	2010-02-11	0103 000	R&R OF IMU S/N 213 WITH S/N 204 ON OV-103 IN IMU SLOT1 PRIOR
			SPAR	TO STS-133
S052924CZ	AUTH K6561A SCHD KSC 039	2009-10-13	0103 001	GROUND LIGHTNING MONITORING SYSTEM (GLMS) INSTALLATION
			NSW	
S052924DA	AUTH K6566 SCHD KSC 039	2009-10-13	0103 001	SSME NOZZLE PURGE HOT WALL CORROSION PREVENTION
			NSW	
TOTAL MODS =		12		

1MRC5 REPT. 4650-1  
PAGE NO. 2

SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0133

PIH

ECP-MCR/KIT SEQUENCE

RUN TIME

06:26 DATE 02/24/2010

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRI0	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
008852	APPD	K826-340001-001	0001 000	ADDITIONAL HARDWARE TO SUPPORT STS-133
NOT REQD				
	KSC			ADDED PER V826-340001 B04
039				

TOTAL MODS = 1

Approved STS-133 OMRS Waivers and Exceptions

WVR EXC	ELEMENT PROJECT	PRCBD NUMBER WAIVER# (STAT) (INITIAL STS)		ABSTRACT RAS REQUIREMENTS	EISN PAYLOAD	STS BEG END	
+	E	RCS	S053296YK EK10327 (A)	OMRSD EXCEPTION REQUEST - RIGHT RC SOXIDIZER B-LEG PAD REGULATOR L OCKUPPRESSURE (EK10327)	0023	032	040
	W	ET	S053293FZ WK03850R1 (A) (STS-093)	L02/LH2 TANK PRESSURE MONITOR FOR MOVE	ET	099	999
		OMS	S053296UM WK10299 (A)	OMRSD WAIVER REQUEST - RP03 TK302 DYNATUBE LEAK RATE (WK10299)	0023	032	040
		ORB	S053298VM WK10557R1 (A)	OMRSD WAIVER REQUEST - FUEL CELL POWERPLANT 3 OXYGEN FLOWMETER LO WERLIMIT (WK10557R1)	103	033	042
			S053299BB WK10603 (A)	OMRSD WAIVER REQUEST - FORWARD OXYGEN REGULATOR LOCK UP PRESSURE( WK10603)	103	034	039
			S053299JU WK10653 (A)	OMRSD WAIVER REQUEST - WATER SPRAY BOILER #1 EXCEEDED 44 PSIA MAX IMUMLIMITATION (WK10653)	103	035	040
		RCS	S053298VTR1 WK10559 (A)	OMRSD WAIVER REQUEST - RIGHT RCS OXIDIZER B-LEG SECONDARY REGULAT ORLOCK UP HIGH (WK10559R1)	0023	035	043
		SRB	S053293WA WK03886 (A)	LH FWD AND RH MID SRB JOINT TEMP SENSORS	BI	099	999

(STS-103)

	Waivers	Except	Deviat	Cannib	Total
Total Extracted	7	1	0	0	8

ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
47	S052310A	02/14/91	Fly with FRSI instead of tile	OV-103, Flight 12 & Subs (flight by flight evaluation)	<b>OK TO RETIRE</b> <b>S061954B MV 4-2</b> <b>RTF-130 Briefing</b>
53	S052428A	03/27/91	Allows specified flights to fly with interim TPS repair after each mission to minimize damage to surrounding tile during ferry flight	STS-37, STS-39, STS-40, STS-42 thru STS-999	<b>STAYS OPEN</b>
101	S076972	11/19/91	Permit the modified GPCs (AP101-S) Battery Back-up Unit to fly with annotated fastener improvements without rolling the LRU Part Number	STS-42, STS-44, STS-47 and STS-49 thru STS-999	<b>STAYS OPEN</b>
327	S115114VR5	03/17/05	Partial installation of M072-784633-014 (harness installation - interface panel - MADS #3). The M072-784663-014 Technical Order was established to incorporate the crossover bracket modification at locations X0863 and X0750. The dash number configuration for the Technical Order was not baselined until January 25, 2005 (PRCBD S115114VR2). This area was closed out before this time and would cause significant impact to verify configuration of this Technical Order dash number -014.	OV-103, Flight 31 OV-103, Flight 32 <b>WAIVER for STS-121</b>	INS-3-28-279 (installed Tech Order)
***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****					
328	S115114WR1	04/07/05	Partial installation of M072-794500-004, for Integrated Vehicle Health Monitoring (IVHM) harness installation, calls for the removal of the unused IVHM harness and routing hardware. This requirement was manifested after the Bay 13 Longerons Bridge installation was complete. With the installation of the bridge, the removal of the IVHM harness is no longer possible without the removal of the bridge.	OV-103, Flight 31 OV-103, Flight 32 <b>WAIVER for STS-121</b>	OEL-3-31-304 PTL OEL-3-31-4432 PTL
***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****					

ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
329	S115114AM	08/15/05	<p>The following requirements are waived to allow OV-103, Flight 31 to fly (ferry) with the following out-of-configuration conditions:</p> <ol style="list-style-type: none"><li>1) V070-391139-025 (blanket under window #1 removed for ferry flight)</li><li>2) M072-421502-002 (did not perform acetone wipe prior to universal thruster plug assemblies - procedural omission)</li><li>3) V070-753110-003 (camera mount will not be installed for ferry flight)</li></ol> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 31	Ferry Flight from Dryden
330	S115114VR15	09/16/05	<p>The following requirement is waived to allow OV-103 to ferry from DFRC to KSC with the following out-of-configuration condition:</p> <p>TCS blanket V070-362917-001 located at Door #44 NOT installed.</p> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 31 Ferry Flight	Ferry Flight from Dryden

ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
331	S115114VR15	09/16/05	<p>The following requirement is waived to allow OV-103 to ferry from DFRC to KSC with the following out-of-configuration condition:</p> <ol style="list-style-type: none"> <li>1) Two switches on Panel A15 will ferry without switch guards (P/N G070-700904-001). In lieu of switch guards at two locations, tape was installed.</li> <li>2) Eight GSE switch guards were left installed and not removed as required by Technical Order M072-710700-002 as called out in the ferry flight drawing.</li> <li>3) Three switch guards are not installed on Panel L4 for TACAN circuit breakers. The procedure does not include the switch guard installation.</li> </ol> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 31 Ferry Flight	Ferry Flight from Dryden
332	S115121TR8	05/04/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>M072-794500-004 IVHM harness installation Bay 13 called out by MECSLSI V072-200201 NOT removed from OV-103.</p> <p>During STS-114 processing this Tech Order configuration called for the removal of an un-used IVHM harness along with the routing hardware. At the time the Tech Order was made a requirement for Flight 31, the Bay 13 longeron had already been installed for flight. The harness was demated and stowed in place per MR and was deferred to a future flight at which time Bay 13 longeron will be removed since the Bay 13 longeron was not removed this flight, a configuration waiver is needed for STS-121.</p>	OV-103, Flight 32	

ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
333	S115121TR8	05/04/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>Partial installation of M072-784633-014 (harness installation - interface panel - MADS#3). The M072-784633-014 Tech Order was established to incorporate the crossover bracket modification at locations X0863 and X0750. The dash number configuration for the Tech Order was not baselined until January 25, 2005 (PRCBD S115114VR2). This area was closed out before this time and would cause significant impact to verify configuration of this Tech Order dash number -014.</p> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 32	
335	S115116NR2	08/18/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>M072-794500-004 IVHM harness installation Bay 13 called out by MECSLSI V072-200195 not removed from OV-103.</p> <p>During STS-114 processing, this Tech Order configuration called for the removal of an unused IVHM harness along with the routing hardware. At the time the Tech Order was made a requirement for Flight 31, the Bay 13 longeron had already been installed for flight. The harness was demated and stowed in place per MR and was deferred to a future flight at which time Bay 13 longeron will be removed since the Bay 13 longeron was not removed this flight, a configuration waiver is needed for STS-116.</p>	OV-103, Flight 33	



ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
336	S115116NR2	08/18/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>M072-794500-004 IVHM harness installation Bay 13 called out by MECSLSI V072-200201.</p> <p>During OMDP, the crossover bracket modification was successfully implemented at all four locations with no technical issues by engineering defined by Orbiter drawings as well as three Tech Orders (M072-794011, M072-794021 and M072-794051). The M072-784633-014 Tech Order was established to incorporate the crossover bracket modification at two locations (X0863 and X0750).</p> <p>At the X0863 location, M072-784633-014 called for the removal of a clamp and six screws to reflect the change harness mounting due to the new wire tray shape. TPS OEL-3-31-245 incorporated the electrical portion of this modification per the vehicle drawings as well as the three tank set harness Tech Orders. During STS-114 processing, the WAD was reviewed and it was determined that an error exists in the M072-784633 engineering. This Tech Order reflects harness routing at the X0863 that does not reflect the as-built configuration on the Orbiter. A one flight configuration waiver was processed and approved for STS-114 and STS-121. All hardware on this Tech Order supports MADS wire routing, there were no observed wire routing violations noted during Flight 31 midbody closeout and all MADS testing will be completed and verified. No technical issue with hardware, installation, or function of MADS. There was no access to this area this flow to perform wire routing as-designed condition. A configuration waiver is needed for STS-116 for this Tech Order.</p>	OV-103, Flight 33	

ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
337	S115116NR4	10/27/06	<p>Tech Order M072-544501-087 - install, M072-544501-027 - remove, -087 configuration is for the new over-center stops being installed. Mission-unique loads will not require these new stops. Program decision was made to not remove the RMS.</p> <p>This configuration will incorporate the over-center stops mod, the change is to all four MPM locations. The new stops, replace existing GFE stops, incorporate a stronger design to address mission-unique loads that have a potential to exceed the current mechanism capability. The decision was made not to incorporate this mod during STS-116 flow due to the low potential for load exceedence. Since -087 established the over-center stops mod along with other mods that were completed for this flow,a configuration waiver is needed for STS-116. In addition the removal of the -027 from the previous mission was not completed.</p>	OV-103, Flight 33	
338	S115116NR4	10/27/06	<p>Tech Order M072-794021-026 install, M072-794021-019 remove, -026 configuration is for the new over-center stops being installed. The change is rerouting and retaping of the wire harnesses near the over-center stops to alleviate any interference. Program decision was made to not remove the RMS.</p> <p>This configuration would reroute and retape harnesses on the MPMs to support the over-center stops mod. Since -026 established a new configuration in support of the over-center stop mod and this was not worked this flight, a configuration waiver is needed for STS-116. In addition, the removal of the -019 from the previous mission was not completed.</p>	OV-103, Flight 33	

ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
342	S115120DR3	09/12/07	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>Tech Order M072-784633-015 harness installation - interface panel - MADS#3 called out by MECSLSI V070-200199 was established to re-route MADS harness in support of SSPTS at location X0863. There was no access to this area this flow to re-route harness to meet as-designed congiguration. At this time there is NO plan to ever open up this area again.</p>	OV-103, Flight 34 thru OV-103, Flight 999	
344	S071024MP	12/20/07	<p>During maintenance of an Advanced Master Events Controller (AMEC) it was discovered that the module cards are able to translate upward, away from connectors. The cards are retained by friction applied by wedge-locks. An assessment determined a 0.070 upward card translation, would result in card disengagement from connectors. The wedge-lock system can not assure the cards will not translate upwards. The AMEC vendor (Boeing Autonetics) is no longer on contract supporting SSP. A design proposal is to provide a secondary connector retention using the AMEC covers. The new design new lids will limit the upward translation to 0.055. The new design will reduce the milled section of the cover and add silicone pads to provide shock absorption. Due to the absence of the original vendor and no current alternate drawings available for the AMEC the modification is being requested via a program directed Material Review (MR).</p> <p>P/N MC450-0016-0029</p> <p>S/N U6F0002, U6F0003, U6F0004, U6F0006, U6F0007, U6F0009, U6F0010 and U6F0011</p> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 35 OV-104, Flight 30 OV-105, Flight 21	

ACTIVE WAIVERS FOR  
OV-103

Item #	Authority	Date	Waiver Description	Effectivity	Wad
352	S115128CR6	10/05/09	<p>The Post-Landing/Ferry Flight Configuration requirement is waived to allow OV-103 to ferry from DFRC to KSC with out-of-configuration conditions for removal of FCV assemblies for ferry flight and install MPS cap and plug set GSE plugs:</p> <p>Three MPS GH2 FCV solenoid and poppet sleeve assemblies (P/N 80420-1301) for each engine.</p> <p>Engine 1 GH2 FCV LV56 Engine 2 GH2 FCV LV57 Engine 3 GH2 FCV LV58</p> <p>Note: The following MPS cap and plug set GSE plugs will be installed in place of the FCVs: 3 G070-602824-001.</p> <p>RATIONALE: There is adequate access and time to remove the requested parts. Removal of these parts is well within USA's experience base. These valves have been removed numerous times at KSC. Removal at DFRC will be no different than removal at KSC. There is no increase in risk performing this work at DFRC, and the early removal will better support the upcoming manifest. There is no GH2 FCV position specified for ferry flight, and no blanket pressure is required. The manifold is firmly mounted/restrained and requires no additional support due to removed FCV components.</p>	OV-103, Flight 37 Ferry Flight	