Program Freeze Point

PRCB Presentation

S115132C
Baseline the STS-132 Mission Specific Requirements and Flow Plans. The STS-132 Integrated Launch Site Requirements were established by PRCBD S115132AR1 dated 10-22-09. This CR and the Associated Data Package were reviewed at the 01-04-10 FRWG.

Flight Operation & Integration* MO3/USA-PI
Orbiter Engineering* Requesting Approval USA-OE
EVA
Payload/Cargo Engineering* USA-PI
SSME Requesting Approval MP21
Launch Vehicle Processing* PH/USA-GO

Status in BackUp
KSC Integration* MK-SIO
Flight Software USA-FSW
Orbiter GFE MV5
KSC ISS and Payload Processing UB-R3

*Backup material included
STS-132 DELTA LAUNCH SITE FLOW REVIEW

STS-132/ISS ULF4

Delta Launch Site Flow Review (LSFR)

Flight Requirements Status

FRWG Jan 4, 2010
PRCB Jan 7, 2010

Phyllis Grounds, MO3 MIM
Robert Reynolds, USA Flight Mgr.
STS-132 DELTA LAUNCH SITE FLOW REVIEW

Ascent Configuration

Return Configuration
STS-132 Payload Integration Services/Interfaces

**Middeck Powered Payloads**
- CGBA-2 (Up/Dn) for Micro2
- CGBA-2 (Up/Dn) for NLP-Cells
- GLACIER - rear breather (36 CFM) (Up/Swap/Dn)

**MRM1** 1st Flight
- Deployable
  - 4 active longeron latches (aft primary)
  - 1 active keel latch
- ROEU provides 28 VDC heater power
- 1553 data
- MDM telemetry
- Commanding from Standard Switch Panel

**ICC-VLD** 2nd Flight
- Deployable
  - 4 active longeron latches (fwd primary)
  - 1 active keel latch

*Note – SPDU supports OBSS*
STS-132 DELTA LAUNCH SITE FLOW REVIEW

LAUNCH
05/14/10
39A/ MLP 2
CREW SIZE: 6UP/6DN

ORBIT
51.6 DEG
122 NM
DIRECT INSERTION
DURATION: 11 + 1 + 2 DAYS

CONFIGURATION
OV-104(32)
LP04;RP01
ET-136
BI-143
RSRM-111

PROPOSED:
(1) 2052 (2) 2051 (3) 2047
OI-34
SRMS, ODS, OBSS, APCU’S
ROEU, SPDU

CONSUMABLES
CRYO TANK SETS 5 (FULL)
GN2 TANKS 5 (FULL)
PAD Hold ~86 HRS (H2 Limited)
FWD RCS 2175# (MIDPOINT)
AFT RCS 4970# (FULL)
OMS 22760# (FULL)

PAYLOAD
ISS-ULF4 ISS-ULF4
(MRM1, MAUI
ICC-VLD. SIMPLEX
ICAPC/PDGF) SEITE
RAMBO-2

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

PROPOSED:
Page 6 of 106
PERFORMANCE MARGIN

• SIMULATION MARGIN (OCFAF132) +3170

• WEIGHT CHANGES SINCE SIMULATION
  • PAYLOAD - 778
  • OPERATOR - 48
  • ORBITER +24
  TOTAL WEIGHT CHANGES - 802 +802

• OTHER PERFORMANCE PROJECTIONS
  • PROTECTION FOR DOL DISPERSIONS - 700
  • SRB – M.P. UPDATES - 164
  • SRB – BR / 2.20 MIL HIGHER THAN 0.3705 AVG +440
  • PROJ TO 5 MIN WINDOW FROM INPLANE - 600
  • PERFORMANCE CHANGES ADJUSTMENT - 56

• CURRENT BASELINED APM (12/15/09) +2892

• PROJECTIONS
  • ISP/THRUST FOR SSME 2052, 2051, 2047 +25

• PROJECTED APM +2917

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

WEIGHTS AND CG’S ARE WITHIN ACCEPTABLE LIMITS

<table>
<thead>
<tr>
<th>CASE</th>
<th>TOUCHDOWN WEIGHT</th>
<th>TOUCHDOWN C.G.</th>
<th>MACH 3.5 WEIGHT</th>
<th>MACH 3.5 C.G.</th>
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<td>1078.2 (1075.2)</td>
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NOTE: RTLS INCLUDES 185 SEC ARCS & 25 SEC FRCS DUMPS
TAL INCLUDES 120 SEC ARCS & 65 SEC FRCS DUMPS
1109 LBS AFT BALLAST

* MRM1 deployed; ICC-VLD2 in ascent config, PDGF still in PLB

ESTIMATES BASED ON OCFAF132 AND MODIFIED FOR WEIGHT CHANGES THRU 12/15/09.
STS-132 Delta LSFR

OV-104 FLIGHT 32
CONFIGURATION UPDATES

PRCB
January 7, 2010

Alvin Jenkins USA Orbiter Element
Elena Seastrom Boeing VPE
Program Authorization Is Requested For The Following:
  • Three (3) Orbiter Modifications
  • One (1) Mission Equipment Modification
  • MECSLSI Updates

Information Only:
  • Chits
  • Pending RCNs
  • Wing Leading Edge (WLE) Spar Inspection
  • Auxiliary Power Unit (APU) Wetted Time Extension
  • Previously Approved Modification

Back-up:
  • Modification Records and MECSLSI Updates Summary
  • Engineering, Hardware and Certification Status
  • TPS Risk Reduction Priorities List and Allocation Breakdown
  • Modification Details
TAD 30282 – Waste Collector System (WCS) Ring Fitting Redesign

- Replaces the existing WCS aft attach point ring fitting with a modified titanium ring fitting
  - Cracks were discovered on the attach point ring fitting for WCS units in all vehicles
    - Initially cracks were discovered on the aft attach point ring fitting during inspection of WCS S/N 123 for OV-105 / STS-130
  - Linear strength analysis performed using NASTRAN model indicated a negative margin for the previous design
  - New design bracket material was changed from aluminum to titanium and material thickness was increased in areas where cracks had previously occurred
    - New design bracket shows positive margin with 20g crash loads
  - First flight of modification will be STS-130
TAD 30283 – Left OMS/RCS Stinger Accelerometer Installation Modification

- Adds safety wire to the fasteners that attach the micro-WIS box to the adapter plate for the stinger accelerometer

  - Authorization requested to add M072-755113-003 installation tech order to the STS-132 MECSLSI, and associated modification record 030283,0104,1 to the configuration baseline
MCR 11620 – WLE RCC Panel Spar Fitting Spacer Modification

- Adds two rivets to the spacer on the right hand rib splice #1 spar fitting to complete the deferred rivet installation per drawing
  - The PR EOTF TES-4-27-0839 action which corrected the rivets omission on the RCC installation drawing was not fully implemented during flight 27 flow and was deferred until next removal of the RCC spar fitting #1 (Ref. TES-4-A0040)
    - MR concurrence was obtained for the spacers installation without rivets until access becomes available because they are retained in place by the bolt and bushing

- The partial deferral of the modification was approved by PRCB on 5/26/06
- Authorization for the completion of the modification is requested since the removal of the RH RCC panel #1 is planned for corrosion inspection during flight 32 flow
  - The rivets retain the spacers to the spar fitting so they do not fall out or require a temporary securing measure when installing or removing the bolt
TAD 30010 – Starboard Lightweight Tool Stowage Assembly (LWTSA)

- Provides new cushion for the starboard Lightweight Tool Stowage Assembly (LWTSA) to accommodate STS-132 Official Flight Kit (OFK)
  - M072-660859-001 LW Starboard TSA installation tech order has been incorporated into the MECSLSI
  - Authorization requested to add associated modification record 030010,0104,8 to the configuration baseline
Update the V072-200212 MECSLSI with the following tech order changes:

- **Left OMS/RCS Stinger Accelerometer Installation**
  - Add M072-755113-003 (Mission Kit MV0886A)
    - Originally -001 was installed for STS-129 to obtain direct measurement of RCS stinger loads; Configuration will be updated to add safety wire to the fasteners that attach the micro-WIS box to the adapter plate for the stinger accelerometer (Ref. OCR/D S165463A)

- **PFR/UFR Longeron Bridge Installation**
  - Add M072-340074-036 (Mission Kit MV0072P)
  - Add M072-340074-037 (Mission Kit MV0072P)
    - High Strength Bridge Clamp (HSBC) is required for MRM1 contingency operation for the push button articulating socket in bay 8 Starboard, locations 1023.70 and 1035.50 (Ref. FRD 17462-132-0020 and OCR/D S165466)
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<tr>
<td>J6275A</td>
<td>ORBITER STRUCTURE IML SURFACE CORROSION SAMPLING INSPECTION</td>
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<td>J6399</td>
<td>0-GAUGE PROTECTION FOR OV-104, FLIGHTS 31-35</td>
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<tr>
<td>J6410</td>
<td>AFT STUB CRACKED TILE INSPECTION</td>
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<td>J6501</td>
<td>STS-129 CIH CLOSE CLEARANCE MEASUREMENTS</td>
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<td>J6527</td>
<td>FRCS THRUSTER CANISTER STUD INSPECTIONS - F5R AND F5L</td>
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<td>J6528</td>
<td>PUTTY REPAIR TILE REPLACEMENT FOR RISK REDUCTION</td>
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<td>J6559</td>
<td>UPPER AFT STUB TILE INSPECTION FOR IN-PLANE CRACKS</td>
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<td>J6577</td>
<td>AMES GAP FILLER REMOVAL AND REPLACEMENT (In review)</td>
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<td>J6579</td>
<td>CAPTURE OV-104 OUTPUT WAVEFORMS TO ADDRESS DIODE CONCERNS</td>
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<tr>
<td>J6582</td>
<td>RUDDER SPEED BRAKE THERMAL TAB INSPECTION (In review)</td>
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</tbody>
</table>
Potential Chits

• W2 and W5 Windows Torque Increase
  – OV-104 W2 and W5 (multi-flight) have been re-torqued to 70 in-lbs as directed by OPO
  – Post flight torque checks will be performed on OV-105 modified windows W1 and W6; Depending on these inspections the decision will be made if the post flight torque check will be required on OV-104 W2 and W5
Pending RCNs

• OMS/RCS Requirements Update (non-standard ops)
  – OV18162 OMS HE Test PT Coupling Max Pressure
  – OV18161 RCS HE Test PT Coupling Max Pressure
    • Defines max op pressure limits when using OMS High Pressure (Helium) test point couplings (not a factor unless He iso valves in the HMF are changed; Scheduled for the board review on 1-22-2010)

• OV18100 TPS Requirements Update
  – Establishes gap between ETD hinge tile and bell crank
  – MLGD periphery step and gap verification for structure work or re-rigging
  – Micro/Tactile inspection of upper aft stub tiles for cracks
  – Micro inspection of upper surface captive gap fillers
  – Inspection of LRSI tiles for cracks
Wing Leading Edge (WLE) Spar Inspection

- Structural inspections of the wing leading edge spars are due prior to the next flight of OV-104, STS-132 (due date January 22, 2010)
  - Performance of these inspections is intrusive and classified as a significant flow impact
    - Last WLE spar full inspection on OV-104 was performed in July 2003; prior OMDP inspections were performed in December 1997
    - PRT's position is full compliance with the requirement is required prior to 1/22/10
  - Coating system refurbishment and re-performance of structural inspections was to be accomplished at the next OV-104 OMDP which was to occur prior to flight 29
- 12 RCC panels and associated spar fittings were removed during the STS-129 flow to perform sampling inspection
  - Panels 12-16 LH and 10-16 RH
  - No active corrosion identified
- On 11/10/09 OCCB approved inspection of the panels 1-9 RH during the STS-132 flow
  - Inspection of the remaining panels 1-11 LH will be deferred to the next flow (STS-335)
  - Exception and Program accepted risk are required to defer inspection of the LH 1-11 panels to the STS-335 flow
Auxiliary Power Unit (APU) Wetted Time Extension

- APUs were due to be replaced prior to STS-132 based on the 5 year wetted time requirement
- Allowable APU wetted time TACCS File II OMRSD was recently increased from 4 years to 5 years based on historical inspection results
  - Further extension of the allowable time period beyond the 5 years required additional inspection and test data
- LOCCB 9/17/09 approved option to perform Disassembly and Inspection (D&I) on APU 401 post WSTF testing to provide for an extension from 5 to 6 years, pending successful D&I and test results
  - Final APU 401 ascent and entry mission duty cycle runs were completed at WSTF
- Based on D&I results on APU 401 and all other data, Boeing and Hamilton Sundstrand engineering have agreed to extend maximum limit for APU wetted time from 5 years to 6 years and 6 months
  - The RCN for new wetted time will be processed in January 2010
  - The QSA for STS-132 was signed on 12/14/09
- The APU removals will not be required during the STS-132 and following flow of OV-104 since the APU wetted time limit has been extended
  - New wetted time limit will allow use of installed units to the end of 2011
Previously Approved Modification

TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation

• Provides dedicated power sources for the Fuel Cell Flowmeter and Cell Performance Monitor (CPM) to protect against power loss to the CPM
  – Existing Shuttle design has the Fuel Cell H2 Flowmeter and the Fuel Cell CPM receiving power from the same 1-amp fused circuit
    • Original design used a 3-amp fuse which was changed in 2004 to 1-amp to preclude the potential for overheated electrical components on Flowmeter circuit boards
    • Part of this change was acceptance of risk for blowing 1-amp fuse for CPM
  – Recent flight anomalies with Fuel Cell H2 Flowmeter have resulted in need to re-evaluate power circuit design
    • During STS-124 MPCA#3 Fuse F6 blew, resulting in loss of both H2 Flowmeter #3 and CPM #3
    • During STS-126 no fuse was blown, however erratic behavior was observed on H2 Flowmeter #1
    • Since STS-126 H2 Flowmeter has been unpowered per MR
  – PRT recommends separation of the Flowmeter/CPM circuits by using the MPCA #1 and #3 fuse spares for Flowmeters #1 and #3, and one of the remaining existing spare MPCA #3 fuses for Flowmeter #2
    • Modification is scheduled to begin on 1-6-2010
EVA Status
STS-132/ULF-4
Delta Launch Site Flow Review

Bridget Ziegelaar
EVA Office
Johnson Space Center
January 7, 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 repair

• **Lightweight Port TSA** – contains standard EVA contingency tools
  – Port LWTSA installation – Tech Order: M072-660850-005
  – Port LWTSA Tools installation – Tech Order: M072-660853-002

• **Lightweight Starboard TSA** – contains OFK (not EVA hardware)
  – Starboard LWTSA installation – Tech Order: M072-660850-006
  – Starboard LWTSA Cushion installation – Tech Order: M072-660859-001

• **Winches**
  – Winch P/N SED33101570-327 on Forward Bulkhead
  – Winch P/N SED33101570-325 on Aft Bulkhead
**STS-132 LSFR**  
*Unique EVA Requirements*

- **Sill Stack hardware installed for launch per FRD17462-132-0020**
  - Provides worksite stabilization for MRM-1 contingency task
  - High Strength Bridge Clamp launching in Bay 8 starboard (Xo = 1035.5)
  - High Strength Bridge Clamp and Push Button Articulating Socket launching in Bay 8 starboard (Xo = 1023.7)
  - Unreleased T.O. M072-340074-036 and -037

- **Three Aft-bulkhead handrails removed for launch**
  - Provides additional clearance for contingency re-berth and return of MRM-1 in the event of a docking mechanism failure
  - Specified handrails are not required for Orbiter contingency EVA tasks
  - CR M9306 has been processed through the DMICB to affect this change

- **Handhold addition to PDGF Increased Capacity Adaptive Payload Carrier (ICAPC)**
  - Provides worksite stabilization for PDGF Retrieval Task
  - ICAPC with Handhold is a certified configuration
  - Requires MECSLSI and PDGF installation Tech Order updates following MIP/FRD revisions
STS-132
ISS-ULF4 – MRM1 / ICC-VLD
Delta Launch Site Flow Review

Payload Cargo Engineering Status

Yvette Carmona
281.212.6492
FRWG: 01/04/10
PRCB: 01/07/10
STS-132  Delta LSFR

Engineering Flight Product Status

<table>
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<th>Drawing</th>
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Open Engineering Updates

- Add EVA High-Strength Bridge Clamps and Socket (approved FRD)
  - MECSLSI
  - Cargo Arrangement Drawing
    
- Remove Handrails from aft bulkhead (approved DMICB)
  - MRM1 installation tech order
  - Cargo Arrangement Drawing

- Add Handhold to PDGF ICAPC (pending FRD, MIP updates)
  - MECSLSI
  - PDGF installation tech order

Rescue-Flight Status

- STS-132 Reconfiguration Engineering Products will be developed by the standard Flight To Follow (FTF) process
Annex 1: ISS-ULF4-NSTS 21541-A01

Activity

• Baseline
  ECD 07/31/09A

• L-4M Update
  – Customer Submittal 12/23/09
  – CR Approval 01/13/10

• L-1M Update
  – Customer Submittal 03/29/10
  – CR Approval 04/13/10
  – Final Weight Log 04/13/10

Time-Critical Ground Handling Requirements

Activity

• Customer Submittal 01/13/10
• Release for Review 02/12/10
• Baseline 03/14/10

Issues / Concerns: None
STS-132 Delta LSFR

Cargo Close-Clearance Process

The following Close-Clearance area has been identified:

- MRM-1 Aft Port Scuff Plate to SRMS MPM
  - Currently just over one-inch (1”) of dynamic clearance
  - This will be monitored during the VLA to see if a close-clearance measurement will be required
Atlantis  STS-132
Delta Launch Site Flow Review

Space Shuttle Main Engine

SSME - KSC
Paul Brzeski
(321) 861-4064
SSME Baseline for STS-132:

- ME-1: 2052 (last hot-fire STS-128)
- ME-2: 2051 (last hot-fire STS-128)
- ME-3: 2047 (last hot-fire STS-128)
### SSME Planned Modifications

#### Mods authorized by Shuttle Project Action Request (SPAR) or Level II Change Request (CR)

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<th>Title</th>
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<th>Kit Drawing</th>
<th>Weight Impact</th>
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<td>Relocate G6 Accelerometer to Gimbal Bearing.</td>
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STS-132
Delta Launch Site Flow Review

January 7, 2010
Agenda

- Assessment/Multi Flow  A. Brewer/NASA
- Milestone Interface Chart  A. Brewer/NASA
- Flight Element Processing  R. Propst/USA
Multi Flow
A. Brewer
Flight Element Processing

Ray Propst
## Flight Element Processing Overview

- **Milestone Summary**  
  To Be Presented

- **Significant Processing Deltas**  
  To Be Presented

- **TPS Status**  
  To Be Presented

- **Issues and Concerns**  
  To Be Presented

- **Integrated Assessment**  
  To Be Presented
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</tr>
</tbody>
</table>

**FLOW MILESTONES**

- 27: KSC Landing
- 27: Orbiter at OFF Door
- 28: CYO Offload Complete
- 30: PEO's Open Complete
- 5: Hyper Offload Complete
- 9: Heatshield Removal Complete
- 11: SME Removal Complete
- 17: OBSS Removal Complete
- 13: OBSS Installation Complete
- SME Installation Complete 23
- Payload Simulate Test Complete 23
- RMS/OBSS End-to-End Testing Complete 2
- Heat Shield Installation Complete 8
- CETT Complete 13
- Integrated Meta Ops Complete 17
- Final PLS Doors Closed 25
- WOT/CO Complete 3
- Ready to Roll, 2
- Rollout First Motion 5

**Legend**

- △: Plan/Baseline
- ♦: Deviation from Baseline
- ◆: Activity Completed
- ▲: Activity Canceled
- Activity Duration
- **** Schedule Change

**Creation Date:** 13-OCT-2009
**Revision Date:** 10-DEC-2009
**Revision:** 13

**Status Date:** 11-DEC-2009
**Plot Date:** 14-DEC-2009, 10:31 am
**Network:** 09F190.701
**Contact:** R.A. Corey, 1-833-1 OFP BAY-1
**E-Mail:** RS007@NASA.gov

Page 40 of 106
Significant Processing Deltas

**Major Components Removal / Replacements**

- Windows 1, 6 & 8
- T-Seal 6L Repair/RCC Adjustment
- Chin Panel /441 Gap Filler Replacement
- WLE Corrosion Inspection – RCC 1 – 9 RH
- 10 of 22 Non-Extendable OMDP Requirements to be Satisfied This Flow

**MODS**

- Fuel Cell CPM Dedicated Power Feed (TAD 30274)
- RH RCC SPAR Fitting Rivet Installation (MCR 11620)
- MEI Instrumentation – Safety Wire To Fasteners (TAD 30283)

**Chits**

- All approved Chits have been partnered and integrated into flow
## TPS Removals

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
<th>LSFR</th>
<th>DLSFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mand</td>
<td>Deferred Tile/ Fib For 1 Flight (Minimum)</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Mand</td>
<td>In-flight Tile/Blanket Damage (Estimate)</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>15</td>
<td>Piano Key Tile (Upper Body Flap)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Mand</td>
<td>Estimated Putty Removals (Grindouts)</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Mand</td>
<td>Operational Damage (Estimate)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Mand</td>
<td>Putty Repairs (Chit Driven)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Mand</td>
<td>Corrosion Sampling</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**BRI Replacement:**

| 10 | MLGD-Outboard Middle 1/3 | 24 | 24 |

**Projected TPS Removals TOTAL (Estimate)**

| 101 | 101 |
TPS Work Content (Additional Work)

LSFR Planned Work:
- I-4 Reqmt: Remove (6) chin carrier panels- Additional NLG T/B Work (6 T/B)
- Remove 9 RCC = (20) LESS Carrier Panel removals

Get Ahead Work
- OMDP Requirement: Re-waterproof all upper surface blankets on Flt-33
  - Complete Vertical Tail during Flt-32

DLSFR Additional (Unplanned Work):
- Chin Panel R&R to support ‘441 Gap Filler replacement and Nose Cap Repair
  - Requires additional (7) NLG Thermal Barrier R&R’s
- ET Door (2) Tile replacements / (5) Thermal Barriers
- Windows 1/6/ 8 = (12) Carrier Panels, Potting, Gap Fillers
- LH RCC #6 Tee Seal = (6) LESS Carrier Panels
- Additional (7) LESS carrier panels (Torque, Flowpath) –Total LESS R&R=(33)
Issues and Concerns

- TPS Work Volume
- Chin Panel/Nose Cap Repair/NLG Thermal Barrier Replacement
Backup Material

FRWG Presentation (With Minor Changes)
Backup Charts-Requirements Documentation Status:
Flight Requirements Document (FRD)
ULF 4 MIP (NSTS 21541)
07700 Vol III, FDRD
STS-132 DELTA LAUNCH SITE FLOW REVIEW

STS-132
Flight Requirements Document (FRD)
DLSFR Status

Robert J. Reynolds
FRWG 1/4/10
PRCB 1/7/10
STS-132 FRD Status

STS-132 FRD Revision 009, dated December 15, 2009:
https://sspweb.jsc.nasa.gov/efrd/

Open CRs

FRD17462-132-0024 – Add Additional 5 MLE Bag (Evaluations due 1/8/10)
FRD17462-132-0025 – Add Bracket Assembly (Evaluations due 1/12/10)

(Recommend putting in backup for PRCB)
1. ULF 4 MIP (NSTS 21541)
   - Current version available on PILS: Basic + Change 8, dated 12/1/09
   - Open CR’s — None
   - Pending CR’s:
     - Update to Appendix E, pending FPSR assessment
     - Updates to Mission Priorities and launch package control weight
     - TBD closures
     - Add reference to DTO 703 Integration Plan and the Annex 5 (POCC) reqmts for ICC-VLD in section 8.4 and 14.0
     - Dual Docked Operations (if required)
     - Updated ICC-VLD Figures

2. Payloads Of Opportunity status:
   - SEITE – NSTS 21542, Basic + Change 2 dated 10/19/09
   - SIMPLEX – NSTS 21327, Revision A, dated 6/16/08
   - RAMBO-2 – NSTS 21556, Basic + Change 1 dated 10/10/09
   - MAUI, NSTS 21530, Basic + Change 2, dated 5/5/08
Back-up

• Modification Record and MECSLSI Updates Summary
• Engineering, Hardware and Certification Status
• TPS Risk Reduction Priorities List and Allocation Breakdown
• Modification Details
## Modification Records and MECSLSI Update Summary

### Orbiter Modifications To Be Baselined

<table>
<thead>
<tr>
<th>MCRI/TAD NO.</th>
<th>TITLE</th>
<th>KIT / MOD RECORD &amp; DESCRIPTION</th>
<th>TECH ORDER IMPACT</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30282</td>
<td>Waste Collector System (WCS) Ring Fitting Redesign</td>
<td>Replaced the existing WCS at attach point ring fitting with a modified titanium ring fitting.</td>
<td>No Tech Order Impact</td>
<td>No MECSLSI Impact</td>
</tr>
<tr>
<td></td>
<td><strong>TCIBM283282REF.0104.0</strong> - Changed the existing bracket material from aluminum to titanium and increased material thickness.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30283</td>
<td>Left OMS/RCS Stinger Accelerometer Installation Modification</td>
<td>Adds safety wire to the fasteners that attach the microWBS box to the adapter plate for the stinger accelerometer.</td>
<td>Add M072-755113-003 MV086A</td>
<td>MECSLSI Impact</td>
</tr>
<tr>
<td></td>
<td><strong>090288A0104.1</strong> - Changes out 4 screws and adds lockwire.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11620</td>
<td>WLE RCC Panel Spar Fitting Spacer Modification</td>
<td>Adds two nuts to the spacers on the installed line asper fitting on the right hand side to complete the designed new installation per drawing.</td>
<td>No Tech Order Impact</td>
<td>No MECSLSI Impact</td>
</tr>
<tr>
<td></td>
<td><strong>TCIBM1911590REF.0104.11</strong> - Completes PR EOTR TES-4-27-0639 action which corrected the rivets omission on the RCC installation drawing.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mission Equipment Modification To Be Baselined

<table>
<thead>
<tr>
<th>MCRI/TAD NO.</th>
<th>TITLE</th>
<th>KIT / MOD RECORD &amp; DESCRIPTION</th>
<th>TECH ORDER IMPACT</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30010</td>
<td>Starboard Lightweight Tool Stowage Assembly (LWTSA)</td>
<td>Provides new cushion for the starboard Lightweight Tool Stowage Assembly (LWTSA) to accommodate STS-132 flight memorabilia.</td>
<td>No Tech Order Impact</td>
<td>No MECSLSI Impact</td>
</tr>
<tr>
<td></td>
<td><strong>090010A0104.8</strong> - Designs and installs a new cushion for STBD TSA.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Previously Baselined Orbiter Modifications

<table>
<thead>
<tr>
<th>MCRI/TAD NO.</th>
<th>TITLE</th>
<th>KIT / MOD RECORD &amp; DESCRIPTION</th>
<th>TECH ORDER IMPACT</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30274</td>
<td>Fuel Cell H2 Flowmeter and CPM Power Source Separation</td>
<td>Provides dedicated power sources for the Fuel Cell Flowmeter and Cell Performance Monitor (CPM) to protect against power loss to the CPM.</td>
<td>No Tech Order Impact</td>
<td>No MECSLSI Impact</td>
</tr>
<tr>
<td></td>
<td><strong>TCIBM293274REF.0104.0</strong> and <strong>TCIBM293274REF.0104.0</strong> - Modify NPCAs 1 &amp; 2 to utilize existing spare 1 amp fuses to power the circuits for the Fuel Cell Hydrogen Flowmeters 1, 2, and 3. Provide separate power sources for Fuel Cell H2 Flowmeter and CPMS.</td>
<td></td>
<td></td>
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</tbody>
</table>
## Engineering, Hardware and Certification Status

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Orbiter Modifications To Be Baselined</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>30282</td>
<td>Waste Collector System (WCS) Ring Fitting Redesign</td>
<td>Released</td>
<td>N/A</td>
<td>N/A*</td>
<td>N/A*</td>
<td>GO</td>
<td>Submitted</td>
<td>1/7/10</td>
<td>23-823200-001E 08-23-823200-001E</td>
<td>* CFE hardware (WCS with a new bracket) will be delivered from the vendor, HS, on 2/19/10, the GO need date is 2/19/10</td>
</tr>
<tr>
<td>30283</td>
<td>Left OMS/RCS Stinger Accelerometer Installation Modification</td>
<td>2/12/10 2/12/10</td>
<td>N/A*</td>
<td>N/A*</td>
<td>GO</td>
<td>1/13/10 1/13/10</td>
<td>03-T3A000015-1001G 131-03-T3A000015-1001G</td>
<td>* Hardware available on site OCR&amp;D S165453A approved 12/11/99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11620</td>
<td>WLE RCC Panel Spar Fitting Spacer Modification</td>
<td>Released</td>
<td>N/A</td>
<td>N/A*</td>
<td>N/A*</td>
<td>GO</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>* Hardware available on site</td>
</tr>
<tr>
<td><strong>Mission Equipment Modification To Be Baselined</strong></td>
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</tr>
<tr>
<td>30010</td>
<td>Starboard Lightweight Tool Stowage Assembly (LWTSA)</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>* Requirements for the cushion have not been defined</td>
</tr>
<tr>
<td><strong>Previously Baselined Orbiter Modification</strong></td>
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<td></td>
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</tr>
<tr>
<td>30274</td>
<td>Fuel Cell H2 Flowmeter and CPM Power Source Separation</td>
<td>Released</td>
<td>N/A</td>
<td>N/A*</td>
<td>N/A*</td>
<td>GO</td>
<td>1/22/10 2/20/10</td>
<td>21-764430-001K 08-21-784430-001K</td>
<td>* Hardware available on site OCR&amp;D S165454 approved 10/20/08</td>
<td></td>
</tr>
</tbody>
</table>
TPS Risk Reduction Priorities List

**Mandatory (everyflow expectation)**

- Flight damage, OMRS Rqmts/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 J6514, J6497, J6504)
- Continue G/F R & R on a best effort basis - zones 2B subset
- Deferred work may be redeferred with acceptable inspection

**Multi-flow Chits**

**Prioritized Opportunity**

1 - 9 1 thru 9 complete on all vehicles (with one exception #7 on OV-104)

7  Inboard Elevon “Hub” Tile Modification – 104 only remaining (2 Tiles Port Side)

10 MLGD BRI-18 – Outboard Middle 1/3 -24 Tiles (6 Door/6 STR)

11 ET Door - Remaining STR side of Door & leading edge on Door - 40 tiles (24 STR/ 16 door)

12 MLGD BRI-18 – Outboard AFT 1/3 - 24 Tiles (6 door/6 STR)

13 Nose Area 9lb/90 SIP Upgrade to FRCI-12 – 14* Tiles (7/side) (*103 16 tiles, thruster)

14 Base Heat Shield 9lb/90 SIP Upgrade to AETB-8 – 42 Tiles (32/stinger, 10/Box Attach point)
15 Body Flap Stub "Piano Key" Upgrade to AETB-8 - 40 Tiles (Order as defined in PRT map)

16 Gap fillers in Subset 2B - 5 Zones (Defined as a line across MLGD edge)

17 Remaining BRI-18 Tile – Remaining MLGD (top priority) / ET Door / LESS carrier panels/NLGD MLGD (Inboard, forward edge working to AFT door edge)
   ET Door
   LESS - panels 8, 9, 10, 7, 6, 5, 4, 3, 2, 1, 11, 12, 13 (in that order)
   NLGD (attrition – do leading edge first)

18 Mod work (WLE sneak flow, WLE Horsecollar Gap Fillers,)

19 MADS Instrumentation Failures (104 & 105 L/H OMS Pod)(place holder)

20 Remaining Gap Fillers & Window BRI-18
   Windows 2, 3, 4, & 5 Upper Carrier Panels (top priority)
# Current Fleet Status

<table>
<thead>
<tr>
<th>Priority Number</th>
<th>Total</th>
<th>OV-103</th>
<th>OV-104</th>
<th>OV-105</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BRI-18 Tile - MLGD FWD O/B Corner</td>
<td>28</td>
<td>complete</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>2. BRI-18 Tile - MLGD FWD Edge</td>
<td>22</td>
<td>complete</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>3. BRI-18 Tile - MLGD O/B Side</td>
<td>18</td>
<td>complete</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>4. BRI-18 Tile - STR side of ET Doors</td>
<td>20</td>
<td>complete</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>5. BRI-18 Tile – LESS Carrier Panels 8-10 (103 &amp; 104)</td>
<td>24</td>
<td>complete</td>
<td>complete</td>
<td>n/a</td>
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<tr>
<td>6. BRI-18 Tile – STR side of ET Doors I/B</td>
<td>8</td>
<td>complete</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>7. Inboard Elevon “Hub” Tile Mod</td>
<td>4</td>
<td>complete</td>
<td>2</td>
<td>complete</td>
</tr>
<tr>
<td>8. I/B Elevon 9lb/90 SIP</td>
<td>34</td>
<td>complete</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>9. O/B Elevon 9lb/90 SIP</td>
<td>6</td>
<td>complete</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>10. MLGD – Outboard Middle 1/3</td>
<td>24</td>
<td>complete</td>
<td>0</td>
<td>complete</td>
</tr>
<tr>
<td>11. ET Door remaining STR side</td>
<td>40</td>
<td>1</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>12. MLGD - Outboard AFT 1/3</td>
<td>24</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>13. Nose Area 9lb/90 SIP</td>
<td>14 (16&lt;sup&gt;OV103&lt;/sup&gt;)</td>
<td>3</td>
<td>complete</td>
<td>7</td>
</tr>
<tr>
<td>14. Base Heat Shield 9lb/90 SIP</td>
<td>42</td>
<td>10</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>15. Body Flap Stub “Piano Key” tiles</td>
<td>40</td>
<td>18</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>16. Gap fillers in Subset 2B</td>
<td>5 Zones</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>17. Remaining BRI-18 - MLGD (top priority) / ET / LESS carrier panels / NLGD</td>
<td>MLGD 100</td>
<td>MLGD 0</td>
<td>MLGD 1</td>
<td>MLGD 0</td>
</tr>
<tr>
<td></td>
<td>NLGD 123</td>
<td>NLGD 15</td>
<td>NLGD 19</td>
<td>NLGD 52</td>
</tr>
<tr>
<td></td>
<td>LESS 88 (92&lt;sup&gt;OV-105&lt;/sup&gt;)</td>
<td>LESS 7</td>
<td>LESS 5</td>
<td>LESS 22</td>
</tr>
<tr>
<td></td>
<td>ET Door 28</td>
<td>ET Door 5</td>
<td>ET Door 2</td>
<td>ET Door 1</td>
</tr>
<tr>
<td>18. Mod work LESS internal</td>
<td>44 locations</td>
<td>40</td>
<td>complete</td>
<td>complete</td>
</tr>
<tr>
<td>20. Remaining Gap Fillers &amp; Window BRI-18</td>
<td>124</td>
<td>3</td>
<td>2</td>
<td>19</td>
</tr>
</tbody>
</table>
TPS Priorities

- Corrosion Sampling: 10%
- BRI-18 (MLGD&ETD): 34%
- Putty Repair: 33%
- 9 lb on 90 SIP (Nose then Base Heat Shield area): 23%

Example

<table>
<thead>
<tr>
<th>Example</th>
<th>Allocation at DLSF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosion Sampling</td>
<td>6</td>
</tr>
<tr>
<td>BRI-18 MLGD&amp;ETD</td>
<td>20</td>
</tr>
<tr>
<td>Putty Repair</td>
<td>20</td>
</tr>
<tr>
<td>9 lb on 90 SIP</td>
<td>14</td>
</tr>
</tbody>
</table>

- Orbiter’s expectations for the work areas are shown on the pie chart
  - The above table is for reference only – exact #’s are determined by the KSC Team
    - Access/configuration/length of flow
  - Distribution provides data/risk reduction in all areas of the list
    - Does not allocate all the resources in one area
Previously Approved Modification

TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation (Cont.)

Fuel Cell / MPCA Locations In Mid-Body
Previously Approved Modification

TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation (Cont.)

Fuel Cell #1 H2 Flowmeter/CPM Wiring

**Current**

- **Signal Conditioner**
- **Power Supply**
- **H2 Flow Transducer 0 To 25 Lb/Hr**

**Proposed Change**

- **Signal Conditioner**
- **Power Supply**
- **H2 Flow Transducer 0 To 25 Lb/Hr**

**Proposed Change**:
- Change from 3A to 4A
- New Wire
- Depin
- 22 Ga
- 24 Ga
- 40E42
- 40W36

**Previously Approved Modification**
Previously Approved Modification

TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation (Cont.)

Current

Proposed Change

Fuel Cell #2 H2 Flowmeter/CPM Wiring
Fuel Cell #3 H2 Flowmeter/CPM Wiring
Payload Cargo Engineering
Backup Charts
OMRSD

• FII V2 Payload (Post-Mate)

  Baselined File
  • 541 - ULF4 Integrated OMRS

  RCNs
  • PP18155 R1 P541 – ULF4 Integrated OMRS Update
    (PSU Switching & Clean Up)
    Board Date 01/12/10

• FII V4 (Pre-Mate)

  Baselined Files
  • S07 STS-132 Mission-Unique List (MUL) - Early Release
  • PS18157R1 FIII MUL
  • PS18156R1 Adjacent Pin Test

  RCNs
  • PS18158R2 S07 STS-132 MUL Update
    Board Date 01/12/10

• FII V6 (Shuttle Experiments)
  • None

• Issues / Concerns
  • None
STS-132 Delta LSFR

Payload ICDs/PIRNs

• All Payload-Unique ICDs are baselined

• PIRNS that impact Flight Products
  – None

• Issues / Concerns
  – None
STS-132  Delta LSFR

Cargo Integration Hardware Status

• Open Work
  – None

• New Build Hardware - All Delivered to KSC
  – Camera Bracket – V787-340035-003 (Mod)
  – AFD Harness – V845-773990-001 (New)
  – PLB Harness – V845-774984-001 (New)
  – PLB Harness – V845-774985-001 (New)
  – PLB Harness – V845-774784-005 (Mod)
  • New Build Harness Leg – V845-774787-001

• Issues/Concerns
  – None
BRI Planning STS-132 (Flight 32)

- RH WING
- LH WING

- COMPLETED= (161)
- FLIGHT 32 PLANNED= (31)

TOTAL= (192)
## STS-132 Delta Launch Site Flow Review

**Overview**

- **SSP System Drawings**: No Issues*
- **SSP Authorized Modifications/Non-Standard Work**: No Issues*
- **SSP OMRS Changes (RCNs)**: To Be Presented

* Backup material included
STS-132 Delta Launch Site Flow Review

Mandatory RCNs:
NONE

Non-Mandatory Value Added RCNs:
OV18004   V09 – RCC THERMOGRAPHY LINE SCAN   ECD 1/8/10
STS-132
Delta Launch Site Flow Review
Flight Software Overview

Tom Stansel
USA FSW

PRCB 01/07/10
STS-132 DLSFR (FSW)

- **STS-132/OV-104 Flight Software (FSW) Versions**
  - Fifth scheduled flight of Operational Increment (OI) 34 Flight Software (SASCB SCR 98107A documents PASS and BFS OI-34 content)
  - Third scheduled flight of MEDS IDP VI 07.01 and fifth scheduled flight of MDUF VI 06.00 (SASCB SCR 98113A documents content for both)
  - Sixth scheduled flight of MAGRS-3S Link 613-996-008 Software (Link-008) (SASCB SCR 98115 documents content)

- **STS-132/OV-104 Flight Software Payload Support:**
  - ISS ULF4
  - Orbiter Interface Unit (OIU)
  - Sequential Still Video (SSV)
  - Payload Power Switching Unit (PPSU)
  - Trajectory Control System (TCS)
  - ISS Caution and Warning (ISSCW)
  - Assembly Power Converter Units (APCUs) & Station to Shuttle Power Transfer System (SSPTS) (generic support for both configurations)
  - Mini Research Module 1 (MRM1)

- **Major New Flight Software Support Items:**
  - None
STS-132 DLSFR (FSW)

• STS-132 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-132 Patch Implementation for Primary Flight Software
  – None.

• STS-132 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-132 Patch Implementation for Backup Flight Software
  – None
STS-132 DLSFR (FSW)

• Products
  – STS-132/OV-104 Base delivery schedule (available to field)
    FPSB
    • Shuttle Data Tape October 16, 2009 A
    • Mass Memory Unit October 23, 2009 A
  – An STS-132/OV104 ADTL Cycle is not required

• Open Items
  – None

• Concerns/Issues
  – No issues or concerns with STS-132 at this time
STS-132 Delta LSFR
FCE/GFE Status

Kenneth Brown
Manager, GFE & Flight Crew Equipment Office
Johnson Space Center
STS-132 LSFR
Flight Crew Equipment/GFE

- All GFE hardware delivery dates were partnered at CIR

- Tech orders and hardware list noted in backup charts, reference only

- No modifications planned for STS-132

- Starboard TSA manifested to contain OFK items but exact configuration TBD (likely will fill to max capacity, possibly add to port TSA)

- Based on DSR-25 clock reset issues experienced in flight (FIAR JSCEV1676F), the VTR may be replaced – delivery TBD

- Planned PTU swap for cameras A, C, Elbow and SP1 in order to manage 5 flight cert limit – no affect on planned delivery date
BACKUP
### STS-132 LSFR Flight Crew Equipment/GFE

Tech Order numbers are identified for reference only. Report generated Dec 14, 2009.

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Tech Order</th>
<th>KSC Eng Need</th>
<th>Eng(TO) Release</th>
<th>In MEC</th>
<th>Cert O/C</th>
<th>Need Date</th>
<th>On-dock Date</th>
<th>Comments</th>
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<tbody>
<tr>
<td>A (port forward)</td>
<td>M072-750025-076</td>
<td>01/26/10</td>
<td>01/17/07</td>
<td>10/20/09</td>
<td>C</td>
<td>02/26/10</td>
<td>02/26/10</td>
<td>PTU swap required (5 flight limit management). Camera from STS-130 which lands 2/16/10. Plan for assy ready for installation 5 days after removed from OV-105 (expedited turnaround). Randall Moore</td>
</tr>
<tr>
<td>B (port aft)</td>
<td>M072-750025-077</td>
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<td>01/17/07</td>
<td>10/20/09</td>
<td>C</td>
<td>02/26/10</td>
<td>02/26/10</td>
<td>Camera/PTU from STS-130 which lands 2/16/10. Plan for assy ready for installation 5 days after removed from OV-105 (expedited turnaround). Randall Moore</td>
</tr>
<tr>
<td>C (starboard aft)</td>
<td>M072-750025-078</td>
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<td>01/17/07</td>
<td>10/20/09</td>
<td>C</td>
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<td>02/26/10</td>
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</tr>
<tr>
<td>D (starboard forward)</td>
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<td>01/17/07</td>
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<td>02/26/10</td>
<td>Camera/PTU from STS-130 which lands 2/16/10. Plan for assy ready for installation 5 days after removed from OV-105 (expedited turnaround). Randall Moore</td>
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<tr>
<td>Payload Ops camera</td>
<td>M072-340107-006</td>
<td>02/04/09</td>
<td>09/25/09</td>
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<td>O</td>
<td>03/04/10</td>
<td>03/04/10</td>
<td>Keel Camera from STS-127/OV-105. 6 month life limit on camera pressurization. Randall Moore</td>
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<tr>
<td>SRMS elbow camera</td>
<td>M072-544504-014</td>
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<td>02/26/10</td>
<td>PTU swap required (5 flight limit management). Camera from STS-130 which lands 2/16/10. Plan for assy ready for installation 5 days after removed from OV-105 (expedited turnaround). Randall Moore</td>
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<tr>
<td>SRMS wrist camera</td>
<td>M072-544504-008</td>
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<td>02/26/10</td>
<td>Camera from STS-130 which lands 2/16/10. Plan for assy ready for installation 5 days after removed from OV-105 (expedited turnaround). Randall Moore</td>
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<tr>
<td>Centerline Airlock Camera (stowed)</td>
<td>M072-660828-002, plus CCCD stow</td>
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<tr>
<td>Lefthand Umbilical Camera (aft)</td>
<td>M072-705001-016</td>
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<td>03/29/10</td>
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<td>Ready to Roll out of OPF planned for 04/02/10. Randall Moore</td>
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<tr>
<td>Righthand Umbilical Camera</td>
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<td>03/29/10</td>
<td>Ready to Roll out of OPF planned for 04/02/10. Randall Moore</td>
</tr>
<tr>
<td>Hardware</td>
<td>Tech Order</td>
<td>KSC Eng Need</td>
<td>Eng(TO) Release</td>
<td>In MEC</td>
<td>Cert O/C</td>
<td>Need Date</td>
<td>On-dock Date</td>
<td>Comments</td>
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<td>Digital Television (DTV)</td>
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<td>MCIU/RMS Situational Awareness Display (RSAD)</td>
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<td>Wireless Video System (WVS)</td>
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<td>M072-344828-001 mount</td>
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<td>M072-744004-012 S-BAND</td>
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<td>RMS Sideview Camera (RSC)</td>
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<td>04/12/10</td>
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<td>Camera from STS-130/OV-105 after repressurization. SSV to PAD A 04/12/10.</td>
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<td>M072-000416-006 camera</td>
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<td>Wing Leading Edge (WLE) Instrumentation - Left Wing</td>
<td>M072-756111-007</td>
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<td>08/21/07</td>
<td>10/20/09</td>
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<td>Wing Leading Edge (WLE) Instrumentation - Right Wing</td>
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<td>OBSS Sensor Package 2 *** (OPF)</td>
<td>M072-710282-006</td>
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<td>01/26/10</td>
<td>04/18/08</td>
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<td>02/26/10</td>
<td>02/26/10</td>
<td>SP2 from STS-129/OV-104.</td>
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<td>OBSS SENSOR PACKAGE 1 ** (OPF)</td>
<td>M072-710282-008</td>
<td></td>
<td>01/26/10</td>
<td>04/18/08</td>
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<td>02/26/10</td>
<td>02/26/10</td>
<td>PTU swap required (5 flight limit management). SP1 from STS-130/OV-105.</td>
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<td>VTR (DSR-25)</td>
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Tech Order numbers are identified for reference only. Report generated Dec 14, 2009.
STS-132/ISS-ULF-4 Delta Launch Site Flow Review

KSC ISS/Payload Processing

Robert Ashley
Mission Management Office (UB-R)
321-867-6037
ISS/PAYLOAD PROCESSING

AGENDA

- Remaining Milestones: In backup
- Issues & Concerns: None
- Master Milestone Schedule (MMS): In backup
- MRM 1 Components: In backup
- ICC-VLD Components: In backup
ISS/PAYLOAD PROCESSING

SIGNIFICANT MILESTONES

SSPF

• SGANT Boom O/D at KSC 13 November 2009 (A)
• SGANT O/D at KSC 2 December 2009 (A)
• SAPA-to-FSE Integration (ready for Antenna installation) 15 December 2009 (A)
• SGANT-to-FSE Integration 7 January 2009
• PDGF O/D at KSC 10 February 2010
• ICC-VLD O/D at KSC & Install into Canister 29 March 2010
• MRM1 O/D at KSC & Install into Canister 5 April 2010

Astrotech Facility @ Port Canaveral (SPPF)

• SGANT Boom T/O to Astrium 7 December 2009 (A)
• MRM1 O/D at SLF, Offload & Transfer to SPPF 17 December 2009 (A)
• EOTP O/D at SPPF 8 January 2010
• EOTP T/O to Astrium 29 January 2010
• SGANT IA T/O to Astrium 9 February 2010
• ISS Batteries (QTY 6) T/O to Astrium 19 February 2010
• Payload Crew Equipment Interface Test (CEIT) 12-13 March 2010 U/R
• ICD Walkdown 15 March 2010 U/R
• MRM1 Processing Complete 4 April 2010

(A) – Actual
U/R – Under Review
Bold

Items in bold are changes since LSFR.
ISS/PAYLOAD PROCESSING

SIGNIFICANT MILESTONES

OPF
• PDGF Installation on Sidewall 23 February 2010

Integrated Operations
• MRM1/ICC-VLD Transfer to Pad A 8 April 2010
• MRM1 IVT 16 April 2010
• MRM1 Internal Air Volume Check and Final Pressure Set 6 May 2010
• Close Payload Bay Doors for Flight 7 May 2010
• Launch 14 May 2010

(A) – Actual
U/R – Under Review

Bold – Items in bold are changes since LSFR
## ISS/PAYLOAD PROCESSING

**STS-132 / ISS-ULF-4 MASTER SCHEDULE**

**Presenter:** Robert Ashley  
**Date:** 1/07/10  
**Page:** 5

### Integrated Master Plan

**ST-132 ISS-33-ULF-4 MRM1: ICC-VLD**

<table>
<thead>
<tr>
<th>Row</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
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</tbody>
</table>

**BOEING POC:**  
**NASA POC:**

**Launch Date NET 05/14/10**

**Threats:**

**Page:** 1 of 1  
**Update:** 09/18/10  
**KSC, ULF-4**
ISS/PAYLOAD PROCESSING

ICC-VLD COMPONENTS

SGANT
SGANT Boom
Keel Camera Target + FSE (Design based on 2JA)

LTA heater cable deleted per MIP CR # 21541-0010
ISS/PAYLOAD PROCESSING

ICC-VLD COMPONENTS

LTA heater cable deleted per MIP CR # 21541-0010

Orbiter Power Connectors (2) with booties

Batteries (6)

PVGF

FWD

ICC-VLD ULF-4 Launch Configuration
STS-132 Delta Launch Site Flow Review

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-132 Delta Launch Site Flow Review**

- STS-132 Orbiter/Ferry Mass Properties Have Been Reviewed by Space Shuttle Program Integration and Are Within Specified Limits

<table>
<thead>
<tr>
<th>Case</th>
<th>Ferry Weight (LB)</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal - Orbiter c.g.</strong></td>
<td>208348</td>
<td>1117.2</td>
<td>0.0</td>
<td>371.5</td>
</tr>
<tr>
<td>(SCA c.g.)</td>
<td>(1412.9)</td>
<td>(N/A)</td>
<td>(513.9)</td>
<td></td>
</tr>
<tr>
<td>(No CM Ballast, No Fluids Off-Loaded, No Payload Bay Opening)</td>
<td></td>
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</tr>
<tr>
<td><strong>AOA - Orbiter c.g.</strong></td>
<td>227862</td>
<td>1113.5</td>
<td>0.2</td>
<td>372.5</td>
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<td>(SCA c.g.)</td>
<td>(1409.3)</td>
<td>(N/A)</td>
<td>(515.0)</td>
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<tr>
<td>(1650 lbs CM Ballast, No Fluids Off-Loaded, No Payload Bay Opening)</td>
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<td><strong>TAL - Orbiter c.g.</strong></td>
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<td>1076.6</td>
<td>0.1</td>
<td>373.9</td>
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<td>(SCA c.g.)</td>
<td>(1372.4)</td>
<td>(N/A)</td>
<td>(518.3)</td>
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<tr>
<td>(3 SSME’s Removed, No Fluids Off-Loaded, No Payload Bay Opening, Max Weight 217000 LB)</td>
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</table>

**X c.g. Limits (Orbiter Coordinates)**
- Nominal = 1060.0 TO 1124.3
- AOA = 1060.0 TO 1116.0
- TAL = 1060.0 TO 1126.2

**Z c.g. Limits (Orbiter Coordinates)**
- Nominal = 360.0 TO 380.0
- AOA = 360.0 TO 380.0
- TAL = 360.0 TO 380.0
SSP System Drawings

The Drawings Baseline Was Released By PRCB S115132 on 08-20-09

- V072-000001-288 (Rev. WE01) Space Shuttle System (Rel. 11-02-09)
- V072-200212-001 (Rev. A01) Mission Equipment Cargo Support (Rel. 10-19-09)
- SGD32104455-401 (Rev. NC) Crew Compartment Configuration (Rel. 10-01-09)
- V070-000001-004 Orbiter General Assembly
- V070-410100-018 SSME Installation
- 10100-0061-180 Integrated SRB General Assembly (BI-143)
- 80901000000-530 External Tank Assembly (ET-136)

- STS-132 LSRR + 18 days Mission Configuration Product Plan (MCPP) was last published on 10-12-09 and will be republished at ORR -14 days on TBD.
Ferry Configuration

- V072-000001-289  (Rev. WC01) Space Shuttle System Drawing (Rel. 09-02-09)
- V072-000002002 (Rev. A01) Mission Equipment Cargo Support (Rel. 10-19-09)
- SGD32104455-001 (Rev. NC) Crew Compartment Configuration (Rel. 10-01-09)
- V072-300055-025  (Rev. BU) Ferry Flight Configuration (Rel. 05-11-09)
Mission Duration = 11+1+2
Inclination = 51.6°
OMS2 ha/hp = 124 x 85 nmi.
Target ha/hp = 203 x 198 nmi.

STS-132 OCF
LAUNCH WINDOW

0200 19:40:56
0220
0240
19:27:46

LAUNCH WINDOW

ISS PLANAR OPENING

15:40:56
17:27:46

EOM+2/KSC
2-1-1-1 KSC
2-2-2-1 EDW

EOM/EDW
1-1-1-2 KSC
1-1-2-1 EDW

SUNSET/KSC

SUNRISE/KSC

TAL/ZZA

Note: EOM lighting lines, based on an OMS2 phase angle of 178 deg, are representative only.
The ISS beta angle (|β| < 60°) for mated operation is beginning – 1/20 14:03:08 MET (FD3 Rendezvous) and ending – 9/15 22:00 MET.
* Indicates the dateline. Launch times above this point are on subsequent days from the date indicated on the corresponding date axis.
Modification Impact Report

- Mission Equipment Modifications and Orbiter Modifications analyzed for impacts to OMRSD, LCC, ICD, EMI, Software, and GSE.

- A total of 7 MCRs have been approved and/or pending mods

- Current MCR impact status:
  - No impacts for all six disciplines: 4
  - One or more disciplines with impacts, documentation approved and/or pending approval: 0
Modification Impact Report – (Continued)

• Possible impacts still under review

• MCR 30283, 30282, and 30274 are being reviewed for all impacts
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S115132AR1
2009-11-02
032

AUTH TCTIV7930274 REF 0104 000
FUEL CELL FLOWMETER/CELL PERFORMANCE MONITORING WIRING MOD
KSC NOT REQUIRED
ADDED BY EDS I/F & V070-774428 A25 & V070-774436 A 15.
REPLACES 030274,0104,0 IN PART

TOTAL MODS = 15
| STAT   | ITEM/KIT NUMBER | SEQ | MCR/ECP | PRIOR | SITE  | TCTI NUMBER | EISN NO. | DESCRIPTION / GENERAL REMARKS                                    | AUTHDATE | FLT 
|--------|-----------------|-----|---------|-------|-------|-------------|----------|------------------------------------------------------------------|----------|----- 
|        | ---             |     | ---     | ----  | ---   |             |          |                                                                 |          |     
|        |                 |     |         |      |       |             |          | ADD HARDWARE REQUIREMENTS IN SUPPORT OF STS-132                   |          |     
|        |                 |     |         |      |       |             |          | ADDED PER THE RELEASE OF EO V787-340035 A02                      |          |     
| 032    |                 |     |         |      |       |             |          |                                                                  |          |     
|        |                 |     |         |      |       |             |          | MRM1 HDWE INTEGRATION REQMT PROVISIONS                           |          |     
|        |                 |     |         |      |       |             |          | ADDED BY EDS I/F & KIT EO NEW                                     |          |     

**TOTAL MODS =** 2
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<td>Allows specified flights to fly with interim TPS repair after each mission to minimize damage to surrounding tile during ferry flight STS-42 thru STS-999.</td>
<td>STS-37, STS-39, STS-40, STS-42 thru STS-999</td>
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<td>Permit the modified GPCs (AP101-S) Battery Back-up Unit to fly with annotated fastener improvements without rolling the LRU and STS-49 thru STS-999.</td>
<td>STS-42, STS-44, STS-47 and STS-49 thru STS-999</td>
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<td>Blanket on the Control Moment Gyro (CMG) Orbital Replacement Unit (ORU) on the Lightweight MPESS Carrier (LMC) will <strong>NOT</strong> be re-installed on-orbit per configuration defined in ICD-A-21494. It will be secured around the FSE and attached to the aft bulkhead.</td>
<td>OV-104, Flight 27</td>
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<td>The following requirement is waived to allow OV-104 to fly with the following out-of-configuration condition: Tech Order M072-544501-067 (RMS, MPM over-center stop and MPM pedestal insulation cover fasteners) will be implemented in total, less the requirement to perform bench rigging per updated specification requirements for for OV-104, Flight 27 and subsequent OV-104 flights until such time that all MPMs can be removed and bench rigging can be performed.</td>
<td>OV-104, Flight 27 thru OV-104, Flight 999</td>
<td>STAYS OPEN</td>
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<td>339</td>
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<td>The following requirement is waived to allow OV-104 to ferry from DFRC to KSC with the following out-of-configuration condition: Retain RH ET Camera installation for ferry flight MECSLSI V072-200197, reference flag note (3), removes (MV0456A) M072-705001-024 RH ET Sep Camera (Digital Camera with 35 mm lens) for ferry flight. The RH ET Camera needs to remain in flight configuration to support resolution of IFA STS-117-V07 Digital Umbilical Camera Image Corruption. Troubleshooting will be performed on the installed hardware after returning OV-104 to KSC.</td>
<td>OV-104, Flight 28</td>
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Prepared by: Jeff McRoberts
USA CM/CVAS
861-2505
12/21/2009
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<td>The following requirement is waived to allow OV-104, Flight 28 to ferry with the following out-of-configuration conditions:</td>
<td>OV-104, Flight 28</td>
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<td>Remove LH OMS Pod LP04 (FIB) blankets prior to ferry flight thermal blanket V070-396376-241 on LOMS Pod lifted at forward leading corner and edges reported on orbit, IFA STS-117-V-02. Two blankets (V070-396376-241 and adjacent V070-396376-051) are removed. RTV ramp applied in cavity up to adjacent blankets per TLP04-28-2520 MRB approval.</td>
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<td>343</td>
<td>S115122GR4</td>
<td>12/07/2007</td>
<td>The following requirement is waived to allow OV-104 to fly with the following out-of-configuration condition:</td>
<td>OV-104, Flight 29</td>
<td>ECL-4-A0118</td>
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<td>Partial installation of Tech Order M072-660010-004, middeck air flow re-routing duct tech order, not to include one each bolt (NAS1003-8A) and one each washer (NAS620C10) in the lower aft corner of the vent housing cover assembly.</td>
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<td>(was ECL-4-29-1637)</td>
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<td>During vertical stowage, the nut plate (not under USA Tech Order configuration control) was noted missing from behind the starboard closeout panel. Without the nutplate, the bolt and washer cannot be installed. The area cannot be currently accessed to reinstall the missing hardware.</td>
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## ACTIVE WAIVERS FOR OV-104

<table>
<thead>
<tr>
<th>Item #</th>
<th>Authority</th>
<th>Date</th>
<th>Waiver Description</th>
<th>Effectivity</th>
<th>Wad</th>
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</thead>
<tbody>
<tr>
<td>344</td>
<td>S071024MP</td>
<td>12/20/07</td>
<td>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).</td>
<td>OV-103, Flight 35</td>
<td>OV-104, Flight 30</td>
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<td>P/N MC450-0016-0029</td>
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***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****
<table>
<thead>
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<tr>
<td>351</td>
<td>S115125BR9</td>
<td>06/03/2009</td>
<td>Allow OV-104 to ferry from DFRC to KSC with out-of-configuration conditions for removal of Flow Control Valve (FCV) assemblies for ferry flight and install Main Propulsion System (MPS) cap and plug set GSE plugs: Three MPS GH2 FCV solenoid and poppet sleeve assemblies (P/N 80420-1301) for each engine. Engine 1 GH2 FCV LV56 Engine 2 GH2 FCV LV57 Engine 3 GH2 FCV LV58 NOTE: The following MPS cap and plug set GSE plugs will be installed in place of the Flow Control Valve System (FCSV): 3 G070-602824-001. 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.</td>
<td>OV-104, Flight 30 (Ferry Flight)</td>
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