Program Freeze Point

PRCB Presentation

S115128C
Re-baseline the STS-128 Mission Specific Requirements and Flow Plans. The STS-128 (OV-104) Launch Site Requirements were established by PRCBD S115128 dated 08-14-08. This CR and the Associated Data Package were reviewed at the 12-15-08 FRWG.

Flight Management* MO3/USA-PI
Orbiter Engineering* Requesting Approval USA-OE
Orbiter Engineering Status in BackUp
KSC Integration MK-SIO
Flight Software USA-FSW
Orbiter GFE MV5
EVA XA
Payload/Cargo Engineering USA-PI

SSME Baseline at LSFR MP21

*Backup Material
STS-128/17A

Delta Launch Site Requirements Review (DLSRR)

Flight Requirements Status

PRCB  December 18, 2008

Shelby Lawson, STS-128 MIM
Frank Richmond, USA Flight Mgr.
Adam Richards/Boeing Mass Properties
<table>
<thead>
<tr>
<th>Presenter</th>
<th>MO3/Shelby Lawson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>12/18/08</td>
</tr>
<tr>
<td>Page</td>
<td>3</td>
</tr>
</tbody>
</table>

### LAUNCH
- **08/06/09**
- 39A/ MLP 2
- CREW SIZE: 7UP/7DN (One crew rotation)

### ORBIT
- 51.6 DEG
- 122 NM
- DIRECT INSERTION (190 NM altitude)
- DURATION: 13 + 1 + 2 DAYS (3 EVAs)

### CONFIGURATION
- **OV-103 (37)**
- LP01: RP03
- ET-132
- BI-139
- RSRM-107
- (1) TBD (2) TBD (3) TBD
- OI-34
- SRMS, OBSS, ODS, SSPTS

### CONSUMABLES
- CRYO TANK SETS 5 (450# O2 OFFLOAD)
- GN2 TANKS 6 (FULL)
- FWD RCS 1912# (OFFLOAD)
- AFT RCS 4970# (FULL)
- OMS 22760# (FULL) – COPV offload

### PAYLOAD
- ISS-17A (MPLM, LMC), MISSE 6,
- TriDAR AR&D Sensor DTO-701A,
- ISS-17A: MAUI, SEITE, SIMPLEX

### LANDING
- SITE KSC
- TAL ZARAGOZA
- ALT. TAL MORON & ISTRES
- SCA 905

### Notes:
- Rescue Flight for STS-127
- Items in italics were approved at the PRCB on 12/4/08 per S042013HQ.
- SIMPLEX per SO72128A (OSB), needs FDRD update.
- Unique flight requirements include possible MPLM late load at the pad.
- FRD CR in review to add DTO 854, Boundary Layer Transition due to OV-103 switch.
PERFORMANCE MARGIN

- SIMULATION MARGIN (OCFAF128) +1775

- WEIGHT CHANGES SINCE SIMULATION
  - PAYLOAD -15
  - OPERATOR +128
  - ORBITER +536
  - NPC +66
  TOTAL WEIGHT CHANGES +715 -715

- OTHER PERFORMANCE PROJECTIONS
  - PROTECTION FOR DOL DISPERSIONS -700
  - 08/06/09 LAUNCH DATE (PMBT&ATMOS) +143
  - SRB – M.P. UPDATES -63
  - SRB – BR / 1.55 MIL HIGHER THAN 0.3705 AVG +310
  - PROJ TO 5 MIN WINDOW FROM INPLANE -600
  - PERFORMANCE CHANGES ADJUSTMENT +50

- CURRENT BASELINED APM (12/16/08) +197

- IPT PROJECTIONS
  - FLIGHT DURATION TO 13+1 +157 -146
  - IPT CRYO OFFLOAD -450 +418
  - IPT ADJUST OMS TIMER +75 -70
  - IPT ADJUST MIDDECK PAYLOADS +109 -101

- IPT PROJECTED APM (12/16/08) +298
FLIGHT MASS PROPERTIES

WEIGHTS AND CG’S ARE WITHIN ACCEPTABLE LIMITS

<table>
<thead>
<tr>
<th>CASE</th>
<th>WEIGHT pounds (LIMIT)</th>
<th>X C.G. inches (LIMIT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOMINAL</td>
<td>225591 (233000)</td>
<td>1087.9 (1075.7)</td>
</tr>
<tr>
<td>RTLS</td>
<td>239867 (245000)</td>
<td>1087.7 (1077.2)</td>
</tr>
<tr>
<td>TAL</td>
<td>238486 (244000)</td>
<td>1087.8 (1077.2)</td>
</tr>
<tr>
<td>AOA</td>
<td>234791 (242000)</td>
<td>1085.6 (1075.7)</td>
</tr>
<tr>
<td>CONT RTRN*</td>
<td>204783 (233000)</td>
<td>1084.5 (1075.7)</td>
</tr>
</tbody>
</table>

*CONT RTRN Case is No MPLM, LMC empty, Full Middeck, Fwd CG

NOTE: RTLS INCLUDES 185 SEC ARCS DUMP, 25 SEC FRCS DUMP
TAL INCLUDES 120 SEC ARCS DUMP, 65 SEC FRCS DUMP
102 LBS AFT BALLAST (BOXES ONLY)

ESTIMATES BASED ON OCFAF128 AND MODIFIED FOR WEIGHT CHANGES THRU 12/16/08.
STS-128 LSRR

OV-103 FLIGHT 37

Belinda Soublet
USA Orbiter Element

December 18, 2008
STS-128 OV-103 Flight 37 – Orbiter LSRR Baseline

Modifications To Be Baselined at LSRR for OV-103 Flight 37
  • 1 mandatory mod to be baselined

Mission Kit Tech Order Changes
  • 3 tech order related changes

Potential modifications (info only)

Additional Requirements being tracked:
  • STR/TPS Priorities
  • Chits
  • Time & Cycle / Deferred WADs (info only)

Authorization Requested for MECSLSI and CCCD Updates for STS-128 (OV-103 Flight 37) Orbiter Mods
  • Incorporate updates to SGD32104451 CCCD and V072-200208 MECSLSI

Backup
  • Modification Information Backup
  • Engineering, Hardware and Certification Status for Proposed Mods
  • OV-103 Current Gapfiller Replacement and BRI-18 Installation Status
STS-128 LSRR Mandatory Mod To Be Baseline for OV-103 Flight 37

**TAD 30189 APU GN2 QD Heater Mod**

- Completion of mod which adds heaters to APU GN2 QDs to mitigate the most likely cause of GN2 system pressure decay observed on previous flights
  
  • Increasing the temperature of the GN2 QD expected to mitigate leak potential
  
  • Heaters added to systems 1 and 2 QDs for STS-119 OV-103 Flt 36

- Heater mod will be installed on system 3 QD during the Flt 37 flow pending no performance issues during STS-119
  
  • Existing system 3 fuel fill line will be replaced with a longer heater and the extra length will be used to heat the system 3 GN2 QD

- Engineering is released
- Hardware required is in stock in logistics inventory
• TAD 30164 – TriDAR (GFE) Installation in Support of DTO-701A
  – The TriDAR sensor will be installed on the Orbiter to demonstrate technology for autonomous rendezvous and docking in low earth orbit
    • TriDAR will be mounted on the external airlock truss adjacent to Trajectory Control Sensor (TCS) 2 in the TCS 1 location, which is no longer flown
      – Similar mechanical and electrical interface arrangement to TCS
    • Hardware furnished by GFE and installed by Boeing TCS tech order which will be updated to establish a unique TriDAR installation configuration
  – Tech order engineering is released – minor engineering cleanup required to transfer to OV-103 end item (originally issued for OV-104 STS-128 installation)
  – MECSLSI update required for the following associated tech order changes
    • (Add) M072-730021-021 (TCS & TriDAR Instl)
      (Remove) M072-730021-019
    • (Add) M072-363838-003 (External Airlock TCS Blanket Instl – TCS & TriDAR )
      (Remove) M072-363838-001
    • Model MV0828A
  – GFE hardware delivery and certification will be addressed in GFE section
TAD 30164 – TriDAR (GFE) Unit and Installation Concept

TriDAR Installation Location on Aft Airlock Truss

Trajectory Control Sensor 2
The following tech order related changes have been incorporated into the MECSLSI – tech order changes are for information only:

- **RMS End Effector Configuration Change**
  - Incorporates GFE hardware upgrade
  - Requires authorization of MRCS Record 017222,0103,6 - RMS End Effector Mod
  - M072-544502-036 Mech Instl Remote Manipulator Instl (Model MV0082A)

- **Demanifest Port Tool Stowage Assembly**
  - STS-128 FRD requirement (weight reduction)
  - M072-660855-001 HW Port TSA Tool Stowage Cushion and M072-660849-005 HW Port TSA Container (Model MV0849A) have been demanifested
Potential Mods (Info Only)

The following are mods that are in development stages in Orbiter and may be brought forward at a future freeze point review:

- 30091 Boundary Layer Transition (BLT) DTO
  - Flight 2 - Increased protuberance height
  - Catalytic coating DTO for 2 thermocouple locations
  - Pending assessment of STS-119 (flight 36) data with 0.25” protuberance
- 30245 ET Door Teflon Seal Design Change
- 30231 Rudder Speed Brake Thermal Clip Redesign
- TBD Tyvek Cover Design Enhancement

The following mods are partially completed but not baselined for STS-128. These will be requested to be baselined OSB if opportunity / priority arises:

- 19735 WLE Spar “Sneak Flow” Protection (RH & LH panels 2-4)
- 19763 Lower WLE CP Horse Collar Gap Filler Redesign (RH & LH panels 2-4)
- 23227 Connector Saver (ME414-0630) Redesign (LH OMS Pod, Ku Band)

LON Requirements, if necessary

- 19798 LON Crew Rescue Recumbent Pallet System
- 19760 Recumbent Seat Kit (Seat 8) Rail Assembly
Breakdown of STS-128 Risk Reduction Work ~ Percentages Shown

TPS Priorities

- Putty Repair: 33%
- BRI (MLGD): 34%
- Corsion Sampling: 10%
- 9 lb on 90 SIP (Nose then Base heatshield): 23%

Orbiter’s expectations for the work areas are shown on the pie chart for STS-128. 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. Does not allocate all the resources in one area.
OV-103 STR/TPS Priorities

**Mandatory**
- Flight damage, OMRS Rqmts/Chits, LRU access, & deferred work
  - Corrosion Sampling (10% of total tile allocation)
  - Putty repairs in RCC & Window DTA Zones of influence
  - Deferred work may be redeferred with acceptable inspection
- Noted: Continue G/F R & R on a best effort basis - zones 2A, 2B and 2B’

**Prioritized Opportunity**

1. **BRI-18 Tile - MLGD (28 Tile) - Complete**
   - 1st subset – FWD and O/B corner – 14/door

2. **BRI-18 Tile - MLGD FWD Edge (22 Tile) - Complete**
   - 2nd subset – fwd & O/B sides – 11/door

3. **BRI-18 Tile - MLGD O/B Side (18 Tile) - Complete**
   - 3rd subset – O/B sides – 9/door outboard side

4. **BRI-18 Tile - STR side of ET Doors (20 Tile) - Complete**
   - 4th subset – ET Doors – 10/door

5. **BRI-18 Tile - LESS Carrier Panels 8-10 (24 Tile) – Complete**
   - 5th Subset – LESS Hot Panels – 12/side
OV-103 STR/TPS Priorities (cont)

6. BRI-18 Tile – STR side of ET Doors Inboard side – AFT 4 Tiles (8 Tile) – Complete
7. Inboard Elevon “Hub” Tile Modification – (both sides) – 4 Tiles – Complete
8. I/B Elevon 9lb/90 SIP Upgrade to FRCI-12 – 34 Tiles (17/side) – Complete
9. O/B Elevon 9lb/90 SIP Upgrade to FRCI-12 – 6 Tiles (3/side) – Complete
10. MLGD – Outboard Middle 1/3 - (6 Door/6 STR) – None completed
11. MLGD – Outboard Aft (1/3 left) 6/door/6 STR)- 24 Tile – None completed
12. Nose Area 9lb/90 SIP Upgrade to FRCI-12 – 14 Tiles (7/side) – (103* 16 tiles, thruster) – 15 remaining
13. Base Heat Shield Stinger 9lb/90 SIP Upgrade to FRCI-12 – 42 Tiles (32/stinger, 10/Box Attach point) – 34 remaining
14. Gap fillers in Subset 2B (Line across MLGD edge) – 3 zones remaining

15. BRI-18 Tile – Remaining MLGD (Top Priority)/LESS carrier panels/NLGD
   1. MLGD (Inboard forward edge working to AFT door edge) – None Completed
   2. LESS - panels 8, 9, 10, 7, 6, 5, 4, 3, 2, 1, 11, 12, 13 (in that order) – 59 tiles remaining
   3. NLGD (attrition – do leading edge first) – 111 tiles remaining

16. Mod work LESS internal (WLE sneak flow, WLE Horsecollar Gap Fillers) – 6 locations remaining

17. MADS Instrumentation Failures (placeholder)

18. Remaining Gap Fillers & Window BRI-18 - 122 remaining
   Windows 2, 3, 4, & 5 Upper Carrier Panels (top priority)
## STR/TPS Priorities Current Vehicle 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>
</tr>
<tr>
<td>6. BRI-18 Tile – STR side of ET Doors I/B</td>
<td>8</td>
<td>complete</td>
<td>1</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>5</td>
<td>complete</td>
</tr>
<tr>
<td>9. O/B Elevon 9lb/90 SIP</td>
<td>6</td>
<td>complete</td>
<td>3</td>
<td>complete</td>
</tr>
<tr>
<td>10. MLGD – Outboard Middle 1/3</td>
<td>24</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>11. MLGD - Outboard AFT 1/3</td>
<td>24</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12. Nose Area 9lb/90 SIP</td>
<td>14 (16&lt;sup&gt;OV103&lt;/sup&gt;)</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13. Base Heat Shield 9lb/90 SIP</td>
<td>42</td>
<td>8</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>14. Gap fillers in Subset 2B</td>
<td>5 Zones</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>15. BRI-18 Tile – Remaining MLGD (Top Priority) / LESS carrier panels/NLGD</td>
<td>MLGD 100 NLGD 123 LESS 66</td>
<td>MLGD 0 NLGD 12 LESS 7</td>
<td>MLGD 1 NLGD 19 LESS 5</td>
<td>MLGD 0 NLGD 26 LESS 12</td>
</tr>
<tr>
<td>16. Mod work LESS internal</td>
<td>44 locations</td>
<td>38</td>
<td>39</td>
<td>complete</td>
</tr>
<tr>
<td>18. Remaining Gap Fillers &amp; Window BRI-18</td>
<td>124</td>
<td>2</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Chit #</td>
<td>Title</td>
<td>Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------------------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6116A</td>
<td>Ames Gap Filler R&amp;R</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6275A</td>
<td>Orbiter Structure IMLSurface Corrosion Sampling Insp</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6341A</td>
<td>Evaluation of OMS Pod LI-900 Tile Installed on 0.90” SIP</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6384</td>
<td>BLT Tempilabel Assessment</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6392</td>
<td>Pre and Post Flight Optigo Scan of Protuberance Tile (Port Wing) to</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>support the BLT Flight Experiment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6402</td>
<td>Micro Inspection of Captive Gap Fillers</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6410</td>
<td>Aft Stub Cracked Tile Inspection</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6414A</td>
<td>Rudder Speed Brake thermal tab Inspection</td>
<td>Pending</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6434</td>
<td>OV-103 Putty Repair</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6443</td>
<td>Z-Scan of BLT Protuberance Tile</td>
<td>Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6447</td>
<td>STS 126 Post Flight Inspection and Contamination Sampling of Laser</td>
<td>Pending</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camera System &amp; Orbiter Locations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6455</td>
<td>APU QD Tempilabel Assessment</td>
<td>Pending</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6XXX</td>
<td>GPS MAGR Link-008 Software Update</td>
<td>Potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6XXX</td>
<td>PLBD C/L Actuator R&amp;R</td>
<td>Potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6XXX</td>
<td>ET Door PDU R &amp; R</td>
<td>Potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J6XXX</td>
<td>Primary Thruster PC Tube Flush</td>
<td>Potential</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## STS-128 Chits cont’d

<table>
<thead>
<tr>
<th>Chit #</th>
<th>Title</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>J6XXX</td>
<td>BLT Protuberance Tile Removal</td>
<td>Potential</td>
</tr>
<tr>
<td>J6XXX</td>
<td>MDM FA1/EIU R&amp;R</td>
<td>Potential</td>
</tr>
<tr>
<td>J6XXX</td>
<td>LMC Close Clearance Measurements</td>
<td>Potential</td>
</tr>
<tr>
<td>J6XXX</td>
<td>MPLM Close Clearance Measurements</td>
<td>Potential</td>
</tr>
<tr>
<td>J6XXX</td>
<td>TriDAR optics and retest requirements</td>
<td>Potential</td>
</tr>
</tbody>
</table>
• Time and Cycle
  – Fuel Cell 3 R&R end of life

• Deferred WADs
  – RP03 Attach Point 2 retorque
    • Requires Pod removal
Backup Material

FRWG Presentation (With Minor Changes)
Flight Operations and Integration (FO&I)

Flight Requirements:
MIP, PIPs, CIP
FDRD
FRD

Backup Charts
### STS-128/17A
**Mission Requirements Status**

<table>
<thead>
<tr>
<th>Documentation</th>
<th>ECD/Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIP – ISS 17A – NSTS 21546, Rev B, Chg 1-2 (9/25/08)</td>
<td>None pending</td>
</tr>
<tr>
<td>CIP - LMC, NSTS 21494, Rev B, Chg 1-12 (8/14/08) STS-128 Addendum</td>
<td>None pending</td>
</tr>
<tr>
<td>PIP – MPLM, NSTS 21499, Rev B, Chg 1-2 (12/7/07)</td>
<td>None pending</td>
</tr>
<tr>
<td>PIP – MAUI, NSTS 21530, Basic, Chg 1-2 (5/5/08)</td>
<td>None pending</td>
</tr>
<tr>
<td>PIP – SEITE, NSTS 21542, Basic (11/19/07)</td>
<td>None pending</td>
</tr>
<tr>
<td>PIP – MISSE 6a and 6b, NSTS 21537, Basic, Chg 1-3 (01/24/08)</td>
<td>None pending</td>
</tr>
<tr>
<td>IP-DTO-701A TriDAR AR&amp;D Sensor, NSTS 21547, Basic (06/05/08)</td>
<td>None pending</td>
</tr>
<tr>
<td>IP – RMS Sideview Camera (RCS), NSTS 21418, Chg 1-3 (06/28/05)</td>
<td>None pending</td>
</tr>
</tbody>
</table>
| FDRD – PRCB S042013HQ Interim Launch Dates         | 12/10/08 (A)
• STS-128 Latest FRD Revision
  • Revision 003: Dated, December 11, 2008 (https://sspweb.jsc.nasa.gov/efrd)

• Approved CRs to be incorporated into next FRD Revision
  • None

• Open/Pending CRs
  • FRD17462-128-011 – Add DTO 854 (Boundary Layer Transition Flight Experiment)
    • ECD: 01/14/09
  • FRD17462-128-012 – Update LiOH Requirements
    • ECD: 01/14/09
STS-128 FRD Status

• STS-128 Latest FRD Revision
  • Revision 002: Dated, November 11, 2008  (https://sspweb.jsc.nasa.gov/efrd)

• Open CRs
  • FRD 17462-128-008 - Add DTO 900 to STS-128 Flight Requirements Document
    ECD: Approved 11/19/08
  • FRD17462-128-010 - STS-128 Vehicle Swap
    ECD: 12/10/08
STS-128 LSRR BACKUP

• Modification Information Backup
• Engineering, Hardware and Certification Status
• Mod Record and MECSLSI Updates
• Current Gap Filler Status
• Current Bri-18 Status
APU GN2 QD System 3 Mod Schematic

Cont CA1
F34
Cont CA3
F23
Cont CA2
F12
PNL A12
S11
APU Htr Tk / Fuel Line 3A

Mn Bus C
Mn Bus C

Gnd

APU 3
Fuel Line Htr 35A
APU 3
Fuel Line Htr 34A
APU 3
Test Line Htr 137A

NEW SERIES HEATER

APU 3
Fuel Fill Line
NEW HTR
WAS Htr 136A

Page 30 of 64
OV-103 Flight 37 Potential Mods

• 30091 Boundary Layer Transition (BLT) DTO – Flight 2
  – Mod / flight experiment involves integrated TPS and MADS instrumentation design to fly with a fixed protuberance tile
    • STS-119 will fly with a protuberance height of 0.25” to initiate BLT at ~Mach 15
  – A total of thirteen thermocouples were installed in TPS tiles: eleven will be in the affected wing area downstream of the transitional cone of influence, one in the protuberance tile, and one as a reference upstream of the protuberance.
    • Ten temperature measurements of the thirteen will be selected and recorded each flight on the MADS instrumentation system
  – Based on STS-119 performance, arc jet testing and analysis, a protuberance height for STS-128 will be selected, potentially in the 0.35 to 0.45 range
### Mods For Baseline at STS-128 LSRR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>30189</td>
<td>APU QD Heater Modification</td>
<td>Released (a)</td>
<td>TBD</td>
<td>N/A (b)</td>
<td>N/A</td>
<td>Go (c)</td>
<td>12/23/08 P</td>
<td>24/11/09 P</td>
<td>CAR 01-09-000602-002G</td>
<td>[a] APU and Wiring engineering is 100% released. (b) Parts available on site. (c) No technical issues - pending successful performance of systems 1 and 2 during STS-119.</td>
</tr>
</tbody>
</table>

Mod partially implemented during flight 36 flow. Heaters added to system 1 and 2 GN2 QDs for STS-119. System 3 will be modified during the flight 37 flow (assuming no issues with STS-119 performance). Heaters will be electrically connected in parallel to the existing System 3 line heaters and will be installed on the line and routed to the QD with an appropriate wrap factor. Over-temperature thermostats (system A & B) will be installed on the parallel leg.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>30164</td>
<td>TriDAR (DTO-701A) Installation</td>
<td>Released (d)</td>
<td>N/A</td>
<td>N/A (GFE) (e)</td>
<td>TBD</td>
<td>TBD (GFE) (e)</td>
<td>1/1500 P</td>
<td>2/2609 P</td>
<td>CR 04-341002J</td>
<td>(d) Tech order installation engineering is released – minor engineering cleanup required to transfer to OV-103 and item (originally issued for OV-104 installation) (e) Hardware delivery and LRU certification is GFE responsibility (f) Boeing certification for LRU installation Ref OCRD S165322</td>
</tr>
<tr>
<td>17222</td>
<td>RMS End Effector Change</td>
<td>Released</td>
<td>N/A</td>
<td>N/A (g)</td>
<td>N/A (g)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Ref M072-544502 C01 V082-0000002 and item EO not released (g) Hardware delivery and certification is NASA GFE responsibility. Boeing certification not affected. Ref OCRD S165341</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demanifest Heavyweight Port TSA for STS-128</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mission Kit Changes For STS-128**

*The autonomous rendezvous and docking sensor (TriDAR) will be integrated into the Orbiter system to demonstrate technology for autonomous rendezvous and docking in Low Earth Orbit. The sensor will be mounted on the deployable truss next to the Trajectory Control Sensor (TCS) 2 in the TCS 1 location which is no longer used. Hardware furnished by GFE and installed by Boeing TCS tech order which will be updated to establish a unique TriDAR installation configuration.*

*In response to an End Effector on-orbit anomaly (back up release stalled) on STS-103, two design mods are being incorporated during planned End Effector refurbishment:
1. The Spring Release Assembly was altered to improve the output torque drive efficiency and reliability. Background: The Back-up release mechanism does not deliver enough torque to overcome minor anomalies, such as debris in some gear passes. Gear ratios were modified on two gears to provide additional torque (2X) and material changes (nitride coating) were made to decrease wear due to mission vibration loads.
2. The Energy Absorber shaft material and processing were changed to reduce chipping of the nitride coating. Background: The Energy absorbers are deteriorating faster than expected, exacerbating wear of some gears. Energy absorber changed to a stronger material (AerMet 100) and coated with iron nitride. Boeing update to the Remote Manipulator Arm Tech Order (Installation drawing M072-544502) implemented to reflect this new -13 EE replacing the -11 EE configuration.*
### Mods For Baseline at STS-128 LSRR

<table>
<thead>
<tr>
<th>MCR NO.</th>
<th>MCR TITLE</th>
<th>KIT.MOD RECORD / TECH ORDER IMPACT DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>30189</td>
<td>APU QD Heater Modification</td>
<td>Placeholder Record 030189.0103.1 - APU QD Heater Mod System 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No Tech Order / MECSLSI Impact</td>
</tr>
<tr>
<td>MCR NO.</td>
<td>MCR TITLE</td>
<td>KIT-MOD RECORD / TECH ORDER IMPACT DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>30164</td>
<td>TriDAR (DTO-701A) Installation</td>
<td>The following records to be authorized at LSRR:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Placeholder Record 030164.0103</strong>.0 - TriDAR DTO Inst Mission Kit End Item Update**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tech Order and MECSLSI Impact:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Add) M072-730021-021 TCS &amp; TriDAR Inst</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Remove) M072-730021-019</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Add) M072-363383-003 (External Airlock TCS Blanket Instl - TCS &amp; TriDAR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Remove) M072-363383-001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Model MV0828A</td>
</tr>
<tr>
<td>17222</td>
<td>RMS End Effector Change</td>
<td><strong>Placeholder Record 017222.0103</strong>.6 - End item updated for end effector mod (To be authorized at LSRR)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tech Order and MECSLSI Impact (Info only for LSRR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(IS) M072-544502-036</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(WAS) M072-544502-033</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remote Manipulator Arm Mechanical Instl</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Model MV0828A</td>
</tr>
<tr>
<td>N/A</td>
<td>Demanifest Heavyweight Port TSA for STS-128</td>
<td>Tech Order and MECSLSI Impact (Info Only for LSRR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Delete) M072-660855-001 HW Port TSA Tool Storage Cushion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Delete) M072-660849-005 HW Port TSA Container</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Model MV0848A</td>
</tr>
</tbody>
</table>
OV-103 Current Gapfiller Location
OV-103 Current Bri-18 Status

RH WING

LH WING

RET

LET

COMPLETED = (139)
FLIGHT 36 BONDED = (7)
TOTAL = (146)
STS-128
Delta Launch Site Requirements Review
Flight Software Overview

Tom Stansel
USA FSW

PRCB 12/18/08
• **STS-128/OV-103 is the First Scheduled Flight of Operational Increment (OI) 34 Flight Software (FSW)**
  – SASCB SCR 98107A documents PASS and BFS OI-34 content

• **STS-128/OV-103 Flight Software Payload Support:**
  – ISS 17A
  – Orbiter Interface Unit (OIU)
  – Sequential Still Video (SSV)
  – Orbiter Docking System (ODS)
  – Trajectory Control System (TCS)
  – Multi-Purpose Logistics Module (MPLM)
  – ISS Caution and Warning (ISSCW)
  – 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-128 DLSRR (FSWE)

- STS-128 Source Changes/Edits for Primary Flight Software (Base)
  - SCR 93211A Update of SSMEC Vehicle Data Table (VDT) for Enhanced Accelerometer
  - SCR 93267A Removal of the Set and Reset to False Cmds For the RCS Tank Iso Valves
  - SCR 93262 Film ET Camera
  - DR 126366 SM GPC Failure to Send GCIL Commands

- STS-128 Patch Implementation for Primary Flight Software
  - None

- STS-128 Patch/Edit Implementation for Backup Flight Software (Base) (included on delivered Mass Memory)
  - None

- STS-128 Patch Implementation for Backup Flight Software
  - None
STS-128 DLSRR (FSWE)

• Products
  – STS-128/OV-103 Base Cycle Product delivery schedule (available to field)
    FPSB
    • Shuttle Data Tape January 20, 2009
    • Mass Memory Unit February 09, 2009

• Open Items
  – None

• Concerns/Issues
  – No issues or concerns with STS-128 at this time
STS-128 LSRR

OV-103 FLIGHT 37

Kenneth Brown
Orbiter GFE

December 18th, 2008
End Effector Swap

• Modifications To Be Baselined at LSRR for OV-103 Flight 37
  • RMS End Effector Upgrade

• MDA is in the process of completing the second End Effector (EE) upgrade on S/N 303:
  – Change the raybestos brakes/clutches to a ceramic material (since raybestos is no longer available)
  – Implement two design modifications to address issues that occurred on STS-103 (back-up release stall)

• EE S/N 303 to be delivered to KSC in February
  – Plan to swap/return to MDA EE S/N 403 for upgrade
EVA Status

STS-128/Flight 17A
Delta Launch Site Readiness Review

XA/Maria Tullar
Johnson Space Center
December 18, 2008
• **Bulkhead PFR – SED33105308-307**
  – Bulkhead PFR installation – Tech Order: M072-661568-029

• **Winches**
  – Forward Winch, SED33101570-327
  – Aft Winch, SED33101570-325

• **No Port LWTSA Box**
  – EVA contingency tools stowed in the middeck
STS-128
ISS – 17A  MPLM, LMC, MISSE 6
△ Launch Site Requirements Review

Payload Cargo Engineering Status

ABBAS ELSABAGH
281.212.6186
12-18-2008
## STS-128 LSRR

### Engineering Flight Product Status

<table>
<thead>
<tr>
<th>Drawing No</th>
<th>Title</th>
<th>Released</th>
</tr>
</thead>
<tbody>
<tr>
<td>V072-200208</td>
<td>MECSLSI</td>
<td>10-03-08</td>
</tr>
<tr>
<td>VA72-200208</td>
<td>Cargo Arrangement</td>
<td>10-10-08</td>
</tr>
<tr>
<td>VD72-200208</td>
<td>Avionics Diagram</td>
<td>10-13-08</td>
</tr>
<tr>
<td>VS72-200208</td>
<td>Integrated Schematic</td>
<td>10-13-08</td>
</tr>
<tr>
<td>VS70-540355</td>
<td>Retention Schematic</td>
<td>10-13-08</td>
</tr>
</tbody>
</table>

- The above engineering released represent STS-128 CIR datapack on OV-104. An update to the engineering to reflect the vehicle change to OV-103 will be at FRED
  - FRED Release is planned for 02-23-09

### Rescue Flight Status

- STS-XXX Reconfiguration Engineering Products will be developed by the Engineering Order To Follow (EOTF) process.

### Engineering Open Work

- FRED
  - ECD: 02-23-08

### Standardization

- Mission Configuration does comply with Orbiter/Payload Integration Standardization Document NSTS 60523
Payload ICDs/PIRNs

All Payload-Unique ICDs are baselined

PIRNS that impact Flight Products

<table>
<thead>
<tr>
<th>PIRN #</th>
<th>ICD/Payload</th>
<th>Title</th>
<th>ECD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A05665</td>
<td>ICD-A-21494/LMC</td>
<td>Update Struct/Mech figures</td>
<td>05-Jan-09</td>
</tr>
</tbody>
</table>

Issues/Concerns

• None
STS-128 ΔLSRR

• **OMRSD**
  - FII V2 (Post-Mate)
    • **Baselined Files**
      • P350 Multi-Purpose Logistics Module (MPLM)
      • P430 SL/ORB Generic I/F Requirements (LMC)
    • **RCNs**
      • PP17785 P546 – ISS-17A Baseline 09/25/08A 01/09/09
      • TBD P430 – LMC Update 12/16/08 01/09/09
      • TBD P1539 – MISSE 6 Baseline 12/16/08 01/09/09
  - FII V4 (Pre-Mate)
    • **RCNs**
      • DPS12739 Mission-Unique List 03/06/09 03/27/09
      • DPS12741 FIII MUL 03/06/09 03/27/09
      • TBD Adjacent Pin Test 03/06/09 03/27/09
  - FII V6 (Shuttle Experiments)
    • **RCNs**
      • TBD TriDAR 12/16/08 01/09/09

- **Issues / Concerns**
  - None
**STS-128 ΔLSRR**

- **Annex 1**
  - ISS-17A MIP Annex 1
    - ISS-17A Annex 1 Baseline 10/03/08A
      - Data needed: ATA drawings, Mass, Safety-Critical Circuit Figure, and center of gravity figures
  - LMC CIP Annex 1
    - 17A LMC Baseline 09/26/08A
      - Data needed: Safety-Critical Circuit Figure, payload axis system definition
  - MISSE 6 PIP Annex 1
    - MISSE 6 PIP Annex 1 Baseline 08/15/08A
      - Data Needed: None

**Open Work**

- None

**Issues/Concerns**

- None
STS-128 ΔLSRR

TGHR Status

Customer Submittal 04-06-09
Release For Review 05/15/09
Baseline 06-05-09

Issues/Concerns
• None
Cargo Close Clearance Process

- The following Close Clearance areas have been identified:
  - MPLM aft port scuff plate to MPM*
  - MPLM to top centerline latches
  - ASI flag (MPLM) to sidewall
  - ATA to aft bulkhead EVA winch*
  - ATA to aft bulkhead WVS antenna*

- A Chit will be developed to take Close Clearance Measurements of Close Clearance Points listed above with *
  - Other points already measured or not accessible

- Chit measurements will be performed at the (PAD) after payload installation
  - ATA will be digitally measured before installation
STS-128 △LSRR

Cargo Integration Hardware Status

Delivery Status

- All available CIH has been delivered
- Unique CIH to support TRIDAR DTO
  - Cable Harness 46P77W983 (qty. 2)
  - Cable Harness 46P77W121 (qty. 1)
  - Cable Harness 46P77W349 (qty. 1)

Issues/Concerns

- None
Delta STS-128 Integrated Launch Site Requirements 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  (Not Available)
• Open Configuration Waivers  Attachment 4
The Drawings Baseline Was Released By PRCB S0115128A on 09-29-2008

- V072-000001-280 (Rev. VR) Space Shuttle System (Rel. 12-05-2008)
- V072-200208-003 (Rev. A) Mission Equipment Cargo Support (Rel. TBD)
- SGD32104451-301 (Rev. NEW) Crew Compartment Configuration (Rel. TBD)
- 302 Descent
- V070-000001-003 Orbiter General Assembly
  - V070-410100-017 SSME Installation
- 10100-0061-176 Integrated SRB General Assembly (BI-139)
- 80901000000-530 External Tank Assembly (ET-132)

**STS-128 CIR + 70 days Mission Configuration Product Plan (MCPP) will be published on 12-29-2008 and will be republished at LSRR +18 days on 01-05-2009.**
### Ferry Configuration

- **V072-000001-281** *(Rev. VR) Space Shuttle System Drawing (Rel. 12-05-2008)*
- **V072-200208-004** *(Rev. A) Mission Equipment Cargo Support (Rel. TBD)*
- **SGD321004451-001** *(Rev. NEW) Crew Compartment Configuration (Rel. TBD)*
- **V072-300055-027** *(Rev. BT) Ferry Flight Configuration (Rel. 12-11-2008)*

**SCA 905**
Modification Impact Report

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

• A total of 4 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
Modification Impact Report – (Continued)

• Possible impacts still under review

• MCR’s 30164 and 30189 are being reviewed for all impacts
<table>
<thead>
<tr>
<th>STAT</th>
<th>ITEM/KIT NUMBER</th>
<th>SEQ</th>
<th>DESCRIPTION / GENERAL REMARKS</th>
<th>AUTH</th>
<th>AUTHDATE</th>
<th>PRIOR</th>
<th>PRCB</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTH</td>
<td>J6275A</td>
<td>0103 002</td>
<td>ORBITER STRUCTURE IML SURFACE CORROSION SAMPLING INSPECTION AND CORROSION SAMPLING CAPABILITIES WILL BE PROJECTED AT LSFR, AND FINALIZED AT DLSFR FOR EACH FLOW.</td>
<td>KSC</td>
<td>2008-02-26</td>
<td>MAND</td>
<td>S-J6275A</td>
</tr>
<tr>
<td>AUTH</td>
<td>J6341A</td>
<td>0103 001</td>
<td>EVALUATION OF OMS POD LI-900 TILE INSTALLED ON 0.090&quot; SIP LI-900 TILE INSTLD ON .090 SIP WILL BE INSPD FOR DEFECTS PER CHIT ON NEAR TERM FLOWS UNTIL RCN IS</td>
<td>KSC</td>
<td>2008-04-09</td>
<td>MAND</td>
<td>S-J6341A</td>
</tr>
<tr>
<td>AUTH</td>
<td>J6384</td>
<td>0103 000</td>
<td>BLT TEMPILABEL ASSESSMENT BLT TEMPILABEL READINGS WILL BE RECORDED POST STS-119 NIB TO OFF PROCESSING.</td>
<td>KSC</td>
<td>2008-08-11</td>
<td>037</td>
<td>S-J6384</td>
</tr>
<tr>
<td>AUTH</td>
<td>J6392</td>
<td>0103 001</td>
<td>PRE &amp; POST FLT OPTIGO SCAN OF PROTUBERENCE TILE (PORT WING) TO SUPPORT THE BOUNDARY LAYER TRANSITION (BLT) FLIGHT EXPERIMENT</td>
<td>KSC</td>
<td>2008-07-28</td>
<td>037</td>
<td>S-J6392</td>
</tr>
<tr>
<td>AUTH</td>
<td>J6402</td>
<td>0103 001</td>
<td>MICRO INSPECTION OF CAPTIVE GAP FILLERS CHIT DOCUMENTS MICRO INSPECTION OF SPECIFIC CAPTIVE GAP FILLERS DUE TO OBSERVED FLT DEGRADATION.</td>
<td>KSC</td>
<td>2008-08-08</td>
<td>037</td>
<td>S-J6402</td>
</tr>
<tr>
<td>AUTH</td>
<td>J6410</td>
<td>0103 001</td>
<td>AFT STUB CRACKED TILE INSPECTION</td>
<td>KSC</td>
<td>2008-09-18</td>
<td>MAND</td>
<td>S-J6410</td>
</tr>
<tr>
<td>AUTH</td>
<td>J6434</td>
<td>0103 001</td>
<td>OV-103 PUTTY REPAIR TPS REPLACEMENT WILL BE ON AN OPPORTUNITY BASIS FOR STS-119 WITH COMPLETION DURING STS-129.</td>
<td>KSC</td>
<td>2008-10-28</td>
<td>037</td>
<td>S-J6434</td>
</tr>
<tr>
<td>AUTH</td>
<td>J6443</td>
<td>0103 001</td>
<td>Z-SCAN OF BLT PROTUBERENCE TILE</td>
<td>KSC</td>
<td>2008-11-19</td>
<td>037</td>
<td>S-J6443</td>
</tr>
</tbody>
</table>

**TOTAL MODS = 8**
<table>
<thead>
<tr>
<th>MCR/ECP</th>
<th>STAT SITE</th>
<th>ITEM/KIT NUMBER</th>
<th>SEQ</th>
<th>EISN NO.</th>
<th>DESCRIPTION / GENERAL REMARKS</th>
<th>PRCB</th>
<th>PRIOR</th>
<th>AUTHDATE</th>
<th>FLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAS</td>
<td>CR S063944A</td>
<td>B139 000</td>
<td></td>
<td></td>
<td>TCTI FOR IMPLEMENTATION OF THE IPT AT KSC</td>
<td>S063944A</td>
<td></td>
<td>2008-11-26</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL MODS =** 1
<table>
<thead>
<tr>
<th>PRCBD NUMBER</th>
<th>EISN</th>
<th>BEG END</th>
<th>ABSTRACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ev10602-a</td>
<td></td>
<td></td>
<td>OMRSD EXCEPTION REQUEST - WING LEADING EDGE SPAR STRUCTURAL SAMPLINGDEFERRAL (Ev10602)</td>
</tr>
<tr>
<td>EK10327-a</td>
<td></td>
<td></td>
<td>OMRSD EXCEPTION REQUEST - RIGHT RCSOXIDIZER B-LEG PAD REGULATOR LOW OCKUPPRESSURE (EK10327)</td>
</tr>
<tr>
<td>EK10452-a</td>
<td></td>
<td></td>
<td>OMRSD EXCEPTION REQUEST - RRCS FUEL GHE TANK P1 TRANSDUCER ACCURACY (EK10452)</td>
</tr>
<tr>
<td>WK03850r1-a</td>
<td></td>
<td></td>
<td>OMRSD WAIVER REQUEST - L02/LH2 TANK PRESSURE MONITOR FOR MOVEMENT (STS-093)</td>
</tr>
<tr>
<td>WK10299-a</td>
<td></td>
<td></td>
<td>OMRSD WAIVER REQUEST - RP03 TK302 DYNATUBE LEAK RATE (WK10299)</td>
</tr>
<tr>
<td>WK10415-a</td>
<td></td>
<td></td>
<td>OMRSD WAIVER REQUEST - MADS FDM CALIBRATION MANUAL MODE (WK10415)</td>
</tr>
<tr>
<td>WK10557r1-a</td>
<td></td>
<td></td>
<td>OMRSD WAIVER REQUEST - FUEL CELL POWERPLANT 3 OXYGEN FLOWMETER LOW WATER LIMIT (WK10557r1)</td>
</tr>
<tr>
<td>WK10603-a</td>
<td></td>
<td></td>
<td>OMRSD WAIVER REQUEST - FORWARD OXYGEN REGULATOR</td>
</tr>
<tr>
<td>Component</td>
<td>Description</td>
<td>Request Number</td>
<td>Time</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>----------------</td>
<td>------</td>
</tr>
<tr>
<td>S053299JU</td>
<td>WATER SPRAY BOILER #1 EXCEEDED 44 PSIA MAX IMUMLIMITATION (WK10653)</td>
<td>S053299JU</td>
<td>103</td>
</tr>
<tr>
<td>S053299MG</td>
<td>FUEL CELL POWERPLANT 3 HYDROGEN FLOWMETER POWER LIMIT (WK10656)</td>
<td>S053299MG</td>
<td>103</td>
</tr>
<tr>
<td>RCS S053298VTR1</td>
<td>RIGHT RCS OXIDIZER B-LEG SECONDARY REGULATOR LOCK UP HIGH (WK10559R1)</td>
<td>RCS S053298VTR1</td>
<td>0023</td>
</tr>
<tr>
<td>PRCBD NUMBER</td>
<td>STS ELEMENT WAIVER# (STAT)</td>
<td>ABSTRACT</td>
<td>EISN</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>------------------------</td>
<td>------</td>
</tr>
<tr>
<td>W SRB S053293 WA WK03886 (A)</td>
<td>LH FWD AND RH MID SRB JOINT TEMP SENSORS</td>
<td>BI 099 999</td>
<td></td>
</tr>
</tbody>
</table>

+------------------+---------+--------+--------+-------+---------------------------------------------------------------+
|                   | Waivers | Except | Deviat | Cannib | Total +---------------------------------------------------------------+
| Total Extracted   | 9       | 3      | 0      | 0      | 12 +---------------------------------------------------------------+