



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



# **STS-126 Integrated Launch Site Requirements Review**

Presenter **Kenneth Nowak**

Date **12-13-07**

## **Program Freeze Point**

## **PRCB Presentation**

## **S115126A**



# STS-126 Integrated Launch Site Requirements Review

Presenter **Kenneth Nowak**

Date **12-13-07**

**Baseline the STS-126 Mission Specific Requirements and Flow Plans. This CR and the associated Data Package were reviewed at the 12-10-07 FRWG.**

**Flight Operations & Integration\***

**MO3/USA-PI**

**Orbiter Engineering\***

**Requesting Approval**

**USA-OE**

**Payload/Cargo Engineering**

**USA-PI**

**Status in BackUp**

**KSC Integration\***

**MK-SIO**

**Flight Software**

**USA-FSW**

**FCE**

**MV5**

**EVA**

**XA**

**To Be Presented at LSFR**

**SSME**

**MP21**



# **STS-126/ULF2**

## **Launch Site Requirements Review (LSRR)**

### **Flight Requirements Status**

**PRCB December 13, 2007**

**Shelby Lawson, STS-126 MIM**

**James Flores, USA Flight Mgr.**

**Adam Richards/Boeing Mass Properties**



<b>STS-126 LAUNCH SITE REQUIREMENTS REVIEW</b>	<b>Presenter</b> Shelby Lawson/MO3	
	<b>Date</b> 12/13/07	<b>Page</b> 2

**LAUNCH**

09/18/08  
 39A/ MLP3  
 CREW SIZE: 7 (One crew rotation)

**ORBIT**

51.6 DEG  
 122 NM  
 DIRECT INSERTION (190 NM altitude)  
 DURATION: 15 + 1 + 2 DAYS (4 EVAs)

**CONFIGURATION**

OV-105 (22)  
 LP03;RP04  
 ET-129  
 BI-136  
 RSRM-104  
 (1) TBD (2) TBD (3) TBD  
 OI-33  
 SRMS,ODS,OBSS,SSPTS

**CONSUMABLES**

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

**PAYLOAD**

ISS-ULF2	ISS-ULF2
MPLM	MAUI
LMC	
SSPL/PSSC	

**LANDING**

SITE	KSC
TAL	ZARAGOZA
ALT. TAL	MORON & ISTRES
SCA	905

Note: FDRD CR SO42013GZ being evaluated to add Shuttle Exhaust Ion Turbulence Experiments (SEITE) payload of opportunity (similar to MAUI) to STS-126, and remove PSSC sidewall from STS-326 since it will not be installed prior to LON call-up.



<b>STS-126 LAUNCH SITE REQUIREMENTS REVIEW</b>		Presenter <b>Shelby Lawson/MO3</b>
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## PERFORMANCE MARGIN

•	SIMULATION MARGIN (OCFAF126)		+2153
•	WEIGHT CHANGES SINCE SIMULATION		
	• PAYLOAD	-433	
	• OPERATOR	<u>+43</u>	
	TOTAL WEIGHT CHANGES	-390	+390
•	OTHER PERFORMANCE PROJECTIONS		
	• PROTECTION FOR DOL DISPERSIONS		-700
	• SRB – BR / 0.05 MIL LOWER THAN 0.3705 AVG		-18
	• PROJ TO 5 MIN WINDOW FROM INPLANE		-600
	• PERFORMANCE CHANGES ADJUSTMENT		<u>-27</u>
•	CURRENT BASELINED APM (12/04/07)		+1198
•	IPT PROJECTIONS – (MIP21514-0003)		
	• INCREASE MIDDECK CONTROL WEIGHT BY 353 LBS (8600 LBS MIDDECK)		-328
	• INCREASE SSPL/PSSC CONTROL WEIGHT BY 5 LBS		-5
	• DECREASE LMC CONTROL WEIGHT BY 514 LBS.		<u>+478</u>
•	PROJECTED APM		+1343



<b>STS-126 LAUNCH SITE REQUIREMENTS REVIEW</b>		Presenter <b>Shelby Lawson/MO3</b>
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**FLIGHT MASS PROPERTIES**  
**WEIGHTS AND CG'S ARE WITHIN ACCEPTABLE LIMITS**

<u>CASE</u>	<u>TOUCHDOWN WEIGHT pounds (LIMIT)</u>	<u>MACH 3.5 X C.G. inches (LIMIT)</u>
NOMINAL	223079 (233000)	1086.6 (1075.7)
RTLS	238750 (245000)	1086.9 (1077.2)
TAL	237369 (244000)	1087.0 (1077.2)
AOA	233674 (242000)	1084.7 (1075.7)
CONT RTRN	204876 (233000)	1084.3 (1075.7)

(CONT RTRN CASE IS NO MPLM, LMC IN LAUNCH CONFIGURATION (FHRC RTN) Fwd CG case)

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

**ESTIMATES BASED ON TDDP OCFAF126 AND MODIFIED FOR WEIGHT CHANGES THRU 12/11/07.**

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# **STS-126 OV-105 Flight 22 LSRR Orbiter Element**

L.R. (Bert) Wagster  
Doug Cline

USA/OE  
Boeing / VMMO

**December , 2007**

# STS-126, OV-105 Flight 22 LSRR Orbiter

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## Purpose:

- Obtain program authorization for baseline of modifications to be performed prior to STS-126, OV-105 Flight 22.
  - Mandatory Mods
  - Potential Mods
  
- Present summary of other requirements
  - Chits

## Back-up

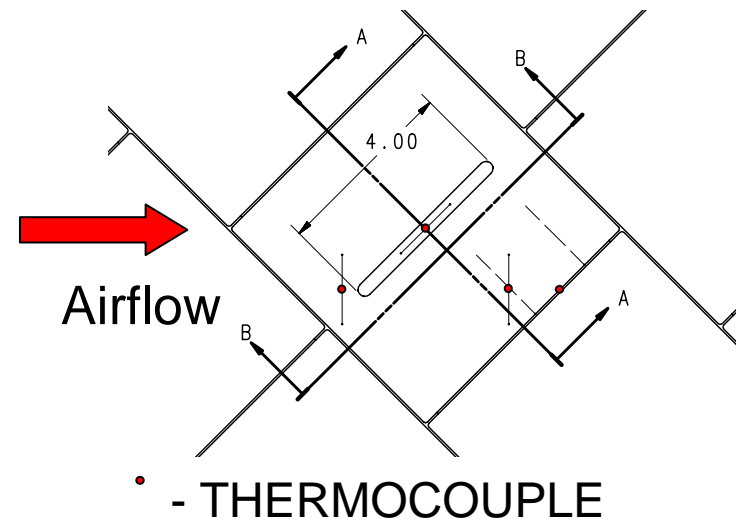
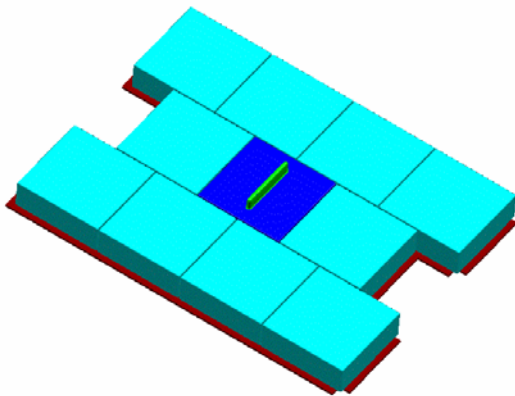
- Modification Matrix
- Description of mods to be baselined
- BRI-18 priority status



# STS-126 OV-105 Flight 22 - LSRR Baseline

Request authorization to baseline the following mod

- **30091 – Boundary Layer Transition DTO** – Modification installs specially designed tile and instrumentation to obtain data during re-entry of heating effects due to early boundary layer transition
  - Installs a “trip tile” with a machined in protrusion to trip the boundary layer at Mach  $\leq 15$  for STS-126
    - Subsequent flight will install trip tile for Mach  $\leq 18$ , Mach  $\leq 19$
  - Mod will install wiring provisions for ten thermocouple instrumented tiles on left hand wing downstream of trip tile

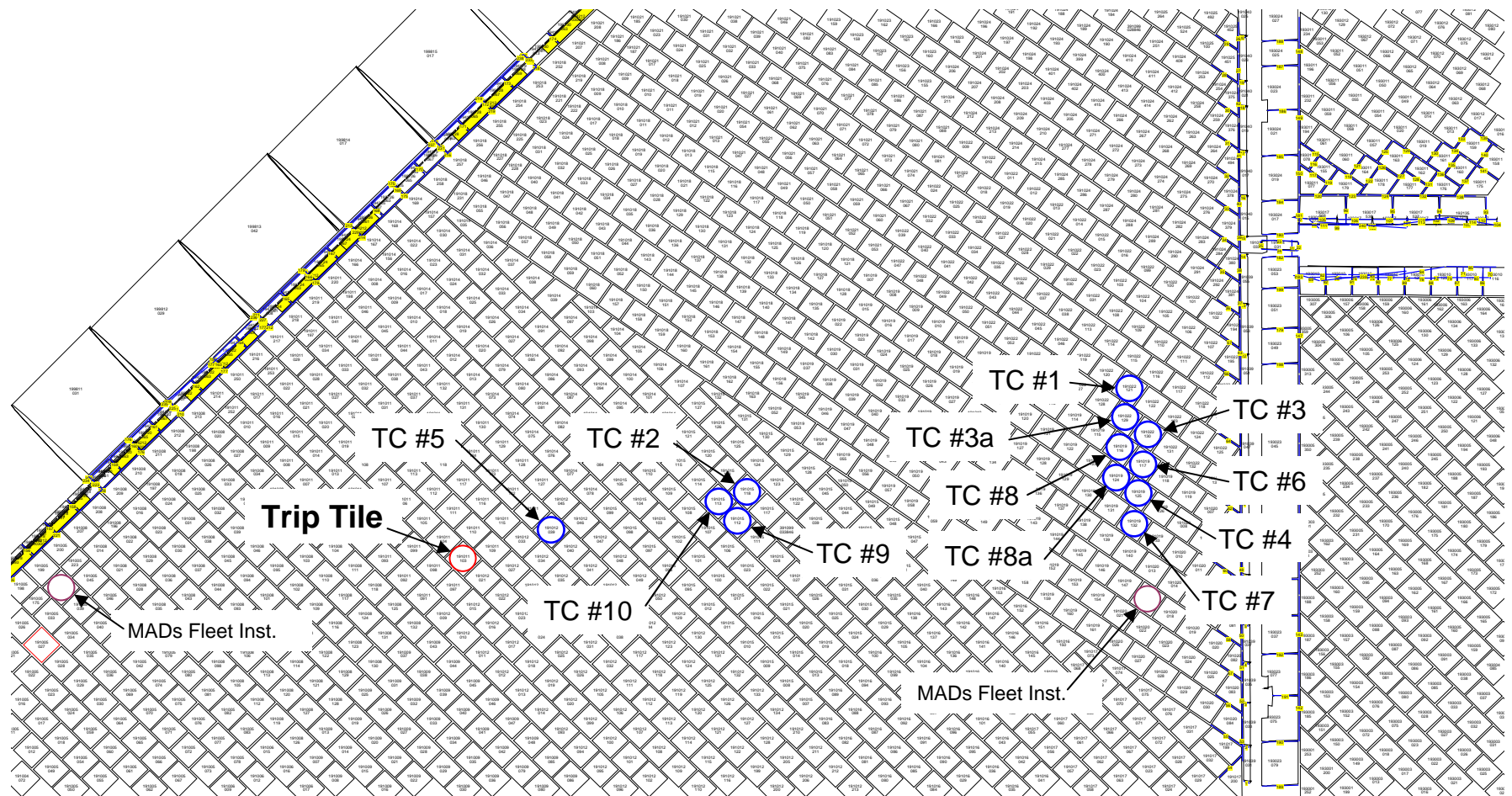


# STS-126 OV-105 Flight 22 - LSRR Baseline

## Boundary Layer Transition DTO Cont.

### View of tile and instrumentation layout on LH Wing

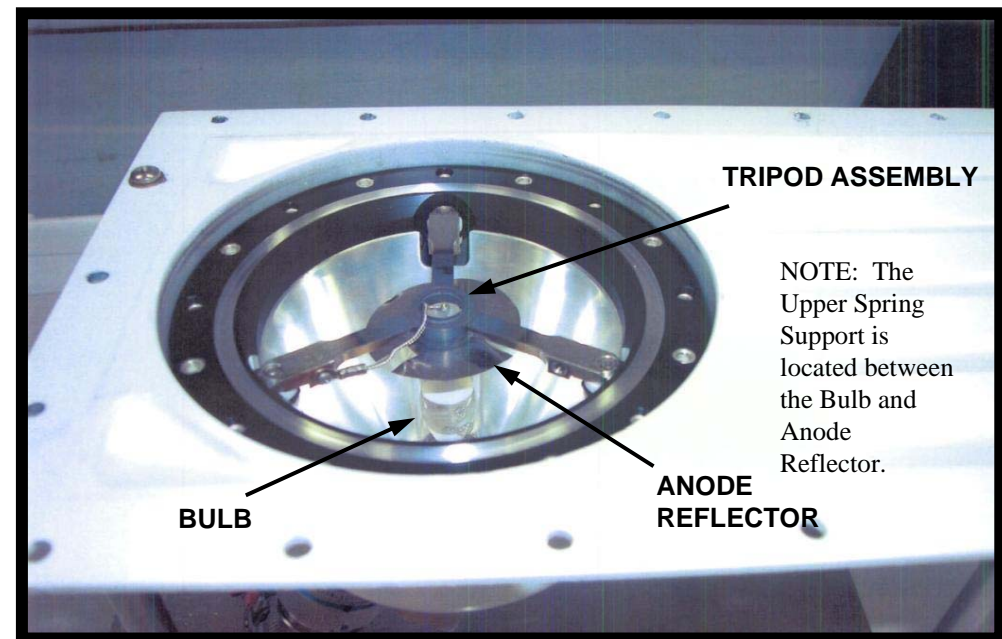
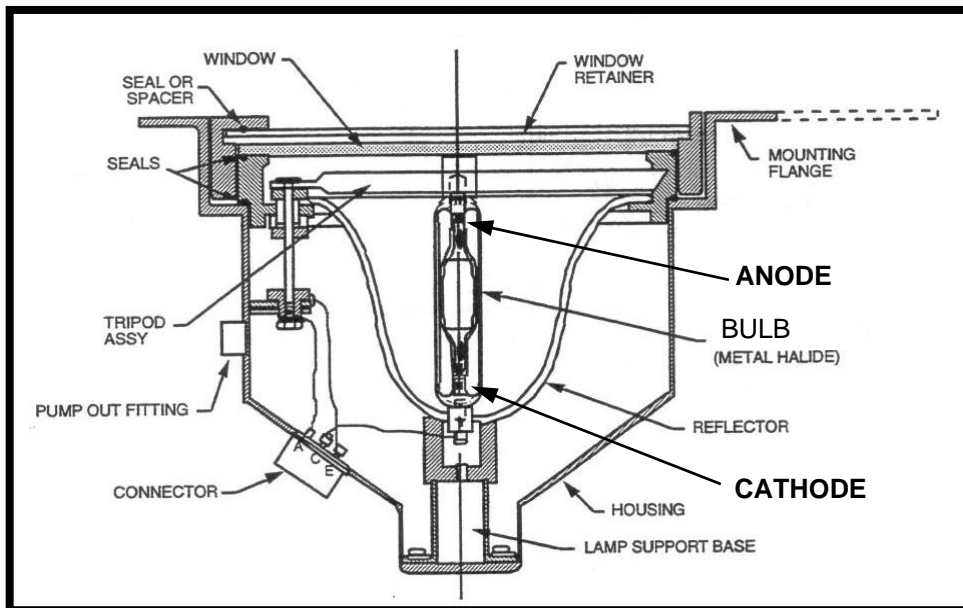
Approximate locations



# STS-126 OV-105 Flight 22 – Potential Modification

## 30121 – Payload Bay Floodlight Anode Reflector Modification –

- Adds an anode reflector to the PLB floodlights to reduce stress and high temperature effect on the floodlight bulb to prevent it from cracking
- Mod will be implemented on 6 payload bay flood light assemblies
- Certification testing and engineering in support of near term flights, STS-124, and STS-125 are in work
  - Plan to baseline in January at LSFR assuming engineering, testing and hardware deliveries go according to plan



# STS-126 OV-105 Flight 22 – Potential Modifications

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## Potential modifications pending approval

### – 30144 Crew Seat Inertia Reel Changeout

- Plan targeted for STS-126 to perform crew seat inertia reel changeout on all M/S, Pilot and Commander seats
  - PLT and CDR seats may be modified while installed in crew module

### – 30025 Main Landing Gear Door Thermal Barrier Cavity Protection

- Modification to add rigidized batting material between the cavity between the thermal barrier and environmental seal
  - Provides added protection of the door environmental seal and surrounding structure in the event of a tile or thermal barrier breach
- Flight Effectivities to be decided following completion of arc-jet tests of candidate design ECD – January 2008

## Potential Attrition Modification

### – IMU Slip Ring Modification

- Possible R&R of second Slip ring modified IMU pending delivery
  - Chit to R&R slot 2, Slot 3 currently has upgraded unit

# STS-126 OV-105 Flight 22 – Potential Modification

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## Potential mission kit modification

### – Wing Leading Edge Sensor System Firmware and Software Upgrade

- This firmware and software upgrade previously planned for implementation on STS-123 was later de-baselined due to sensor relay issues
- Subsequent firmware troubleshooting may identify a follow-on upgrade to the sensor system firmware configuration for STS-126
- If implemented, update to the V072-200206 MECSLSI with the following tech order changes (cont.):
  - **Add M072-756111-xxx and remove M072-756111-007**
    - This is the LH side for the Wing Leading Edge Micro-Wis Sensors.
  - **Add M072-756111-xxx and remove M072-745111-008**
    - This is the RH side for the Wing Leading Edge Micro-Wis Sensors.

# RCNs/Chits

The following are presented for information only

Pending RCNs No.	Title/Description	Notes
OVxxxxx	GPS MAGR receiver battery changeout Revise battery changeout from once/year to every 6 months	To be released in January, '08 Planned effectivity for STS-124 and Subs

Chit No.	Title	Description
J5927	OV-105 Body Flap (BF) Power Drive Unit (PDU) Gearbox Fluid Level Inspection	Performs second of two fluid checks to assess potential fluid leakage during flight
J6275	Orbiter Structure IML Surface Corrosion Sampling Inspection	Pending Approval Performs inspections beneath tile in specified areas to complete sampling started under previous chit J5930
J6295	OV-105 IR Thermography, RCC panels 14L, 13L 9R joggle areas	Previously approved thermography to observe joggle area indications after mission cycle
J6306	OV-105 Mid Fuselage Lockbolt collar inspections	Approved – Performs sampling prior to Flights 21, 22 and 23
JXXXX	ASA and ATVC R&R for Tin Whisker remediation	Further Tin Whisker remediation will R&R ASA slot #1, #2 and ATVC slot #1, #4 to establish 4-4-2-2 (ASA-ATVC-RJDA-RJDF) remediated box configuration

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**STS-126/ULF2 – MPLM, LMC, PSSC  
LAUNCH SITE REQUIREMENTS REVIEW  
(LSRR)**

**PAYLOAD CARGO ENGINEERING STATUS**

**Abbas Elsabagh  
Cargo Mission Manager  
281-212-6186  
December 13, 2007**

# STS-126 LSRR

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## ENGINEERING FLIGHT PRODUCT STATUS

<u>DRAWING NO</u>	<u>TITLE</u>	<u>REV</u>	<u>EO</u>	<u>RELEASED</u>
V072-200206	MECSLSI	Basic	-	11-15-07
VA72-200206	CARGO ARRANGEMENT	Basic	-	11-15-07
VD72-200206	AVIONICS DIAGRAM	Basic	-	11-16-07
VS72-200206	INTEGRATED SCHEMATIC	Basic	-	11-16-07
VS70-540335	RETENTION SCHEMATIC	Basic	-	11-14-07

## ENGINEERING OPEN WORK

- FRED 2-13-07

## STANDARDIZATION

- MISSION CONFIGURATION DOES COMPLY WITH ORBITER/PAYLOAD INTEGRATION STANDARDIZATION DOCUMENT NSTS 60523

## RESCUE FLIGHT STATUS

- STS-326 RECONFIGURATION ENGINEERING PRODUCTS WILL BE DEVELOPED BY THE ENGINEERING ORDER TO FOLLOW (EOTF) PROCESS.



# STS-126 LSRR

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## RESCUE FLIGHT STATUS CONTINUE:

- **FOR STS-400: OV-105 WILL BE CONFIGURED PER STS-400 REQUIREMENT PRIOR TO OPF ROLL-OUT. A CONFIGURATION WAIVER WILL BE SUBMITTED FOR PROGRAM APPROVAL AT dLSFR**
  
- **STS-400 PAYLOAD CARGO ENGINEERING IMPLEMENTATION:**
  - **THE PAYLOAD BAY CONFIGURATION DIFFERENCES BETWEEN STS-126 AND STS-400 WILL BE:**
    - **NO MPLM OR LMC INSTALLED**
      - **MPLM KEEL LATCH OPEN TO PREVENT SLIDING**
      - **ROEU IN UNMATED/STOWED CONFIGURATION**
    - **PAYLOAD MATE TECH ORDER (LMC TO LIP CABLE) NOT INSTALLED**
      - **LIP CONNECTOR CAPPED**
    - **SECONDARY PASSIVE LATCHES PINNED (LMC)**
    - **NO LATCH GUIDES ON MPLM LATCHES**
  
  - **SINGLE MECSLSI CONFIGURED TO STS-126 REQUIREMENTS**
    - **DELAY INSTALLATION OF PAYLOAD, PAYLOAD MATE, AND LATCH GUIDE TECH ORDERS UNTIL AFTER RELEASE FROM STS-400**
    - **USE CHIT TO AUTHORIZE TEMPORARY INSTALLATION OF FLIGHT PIN IN SECONDARY PASSIVE LATCHES**  
ECD: 02/13/08
    - **CAP UNUSED CONNECTOR ON LIP FOR LMC POWER PER WIRING SPECIFICATION**
  
  - **PROGRAM CONFIGURATION WAIVER WILL SUBMITTED AT dLSFR SCHEDULED IN MARCH 2008 TO DOCUMENT THE DIFFERENCES BETWEEN STS-400 AND STS-126 AND TO ALLOW THE LAUNCH OF STS-400 WITHOUT MECSLSI UPDATE**

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## OMRSD

- FII V2 (POST-MATE)

### BASELINED FILES

- P350 MULTI-PURPOSE LOGISTICS MODULE (MPLM)
- P430 SL/ORB GENERIC I/F REQUIREMENTS (LMC)

### RCNS

- PP17554 P514 – ISS-ULF2 BASELINE
- TBD P430 – LMC UPDATE
- PP17578 P1539 – SSPL/PSSC BASELINE
- TBD P350 – MPLM UPDATE

### RELEASE

- 11/07/07A
- 12/14/07
- 12/14/07
- 12/14/07

### BASELINE

- 01/08/08
- 01/29/08
- 01/15/08
- 01/29/08

- FII V4 (PRE-MATE)

### RCNS

- DPS12547 MISSION-UNIQUE LIST
- DPS12548 FIII MUL
- TBD ADJACENT PIN TEST

### RELEASE

- 02/22/08
- 02/22/08
- 02/22/08

### BASELINE

- 03/13/08
- 03/13/08
- 03/13/08

- FII V6 (SHUTTLE EXPERIMENTS) – NONE

- ISSUES / CONCERNS: NONE

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## ANNEX 1

<u>ISS-ULF2 - NSTS 21514</u>	<u>CUSTOMER</u> <u>SUBMITTAL</u>	<u>CR RELEASE</u>	<u>ECD</u>
• <b>BASELINE</b>	10/18/07A	10/18/07A	11/27/07A
• <b>POST-CIR UPDATE</b>	12/11/07	12/14/07	01/11/08
<u>DATA REQUIRED</u> – OFFICIAL FHRC & NTA MASS PROPERTIES, SAFETY-CRITICAL SWITCH LIST, AND FHRC & NTA PAYLOAD AXIS SYSTEM DATA AND FIGURES			
• <b>INTERIM CR</b>	04/28/08	05/05/08	05/19/08
<u>DATA REQUIRED</u> – SAFETY-CRITICAL CIRCUIT DIAGRAM, FHRC & NTA CENTER OF GRAVITY FIGURES (IF AVAILABLE)			
• <b>FINAL WEIGHT UPDATE (L-1 M)</b>	08/04/08	08/11/08	08/18/08

## ISSUES/CONCERNS

- **BASELINED WITHOUT MASS PROPERTIES FOR FHRC & NTA AND WITHOUT A COMPLETE SET OF RELEASED MECHANICAL DRAWINGS AND FIGURES FOR FHRC AND NTA**

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## ANNEX 1- CONT.

<u>LMC - NSTS 21494</u>	<u>CUSTOMER</u>		
	<u>SUBMITTAL</u>	<u>CR RELEASE</u>	<u>ECD</u>
<ul style="list-style-type: none"><li>• <b>BASELINE</b></li></ul>	<b>12/11/07</b>	<b>12/17/07</b>	<b>01/11/08</b>
<b><u>DATA REQUIRED</u> – OFFICIAL WEIGHT AND MASS PROPERTIES DATA, PAYLOAD AXIS SYSTEM FIGURE, STATIC LENGTH, AND MECHANICAL AND ELECTRICAL DRAWING</b>			
<ul style="list-style-type: none"><li>• <b>INTERIM CR</b></li></ul>	<b>04/28/08</b>	<b>05/05/08</b>	<b>05/19/08</b>
<b><u>DATA REQUIRED</u> – SAFETY-CRITICAL CIRCUIT DIAGRAM, MECHANICAL AND ELECTRICAL DRAWING UPDATES, AND CENTER OF GRAVITY FIGURES</b>			
<ul style="list-style-type: none"><li>• <b>FINAL WEIGHT UPDATE (L-1 M)</b></li></ul>	<b>08/04/08</b>	<b>08/11/08</b>	<b>08/18/08</b>

## ISSUES/CONCERNS

- **WILL BE BASELINED LATE**

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## ANNEX 1- CONT.

<u>SSPL/PSSC - NSTS 21539</u>	<u>CUSTOMER SUBMITTAL</u>	<u>CR RELEASE</u>	<u>ECD</u>
• <b>BASELINE</b>	<b>10/19/07A</b>	<b>10/29/07A</b>	<b>11/12/07A</b>
• <b>POST-CIR UPDATE</b>	<b>12/11/07</b>	<b>12/17/07</b>	<b>01/11/08</b>
<b><u>DATA REQUIRED</u> – PAYLOAD CONFIGURATION NUMBER, ELECTRICAL/AVIONICS CABLE DATA, FUNCTIONAL FLOW DIAGRAM</b>			
• <b>INTERIM CR</b>	<b>03/31/08</b>	<b>04/07/08</b>	<b>04/18/08</b>
<b><u>DATA REQUIRED</u> – SAFETY CRITICAL CIRCUIT DIAGRAM, MECHANICAL DRAWINGS, SPUN-UP PAYLOAD DATA</b>			
• <b>FINAL WEIGHT UPDATE (L-1 M)</b>	<b>08/04/08</b>	<b>08/11/08</b>	<b>08/18/08</b>

## ISSUES/CONCERNS

- **NONE**

# STS-126 LSRR

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## TGHR STATUS

CUSTOMER SUBMITTAL	5-19-08
RELEASE FOR REVIEW	6-19-08
BASELINE	7-18-08

## ISSUES/CONCERNS

- None

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

<u>Document</u>	<u>Title</u>	<u>ECD</u>	<u>Status</u>
ICD-A-21494	LMC	12/18/00	Baselined
TBD	As Flown Configuration Update (need CAD Model)*	03/16/08	Pending Model
TBD	Update Hazard Events Table (Exposed powered connectors)*	02/29/08	In Work
ICD-A-21350	MPLM	02/12/96	Baselined
A05277*	Remove "Active" MPLM Dataset	01/31/08	In Work
A05523*	Latch guide constraints due to OBSS	12/21/07	In Review
TBD	Add Hazard Events Table	03/16/08	In Work
Future Work:	Incorporate ISS IDD IRNs (Approx L-5 mo) Document Trunnion Scratch		

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

<u>Document</u>	<u>Title</u>	<u>ECD</u>	<u>Status</u>
ICD-A-21514-OOR	ISS-ULF2		
A05488*	ICD Baseline	12/17/07	In Review
TBD	Add Hazard Report Number	03/18/08	
TBD	VA Drawing #	03/18/08	
Future Work:	Add Loads/Robotics data (Approx L-1 month)		Awaiting JTWG Inputs
	On-Orbit Translation Clearance Violations (Approx L-3 month)		
	Update Thermal Data (L-5 months)		
ICD-A-21342	ODS-ISS	05/24/96	Baselined
ICD-A-21539	SSPL/PSSC		
A05437*	ICD Baseline	01/16/08	In Review



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

<u>Document</u>	<u>Title</u>	<u>ECD</u>	<u>Status</u>
ICD-A-21429	DTV	03/10/99	Baselined
ICD-A-21449	MINICAM/Downlink	01/28/99	Baselined
ICD-A-21264	OIU	08/17/95	Baselined
ICD-A-21403	SSV	03/17/97	Baselined
ICD-A-21420	VPU	01/14/98	Baselined
ICD-A-21418	RSC	12/16/98	Baselined

### Issues/Concerns

- SSPL/PSSC compatibility statement not signed until ICD is baselined

# STS-126 LSRR

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## CARGO CLOSE CLEARANCE PROCESS

- **THE FOLLOWING CLOSE CLEARANCE AREAS HAVE BEEN IDENTIFIED:**
  - **MPLM SCUFF PLATE TO MPM**
- **NEED TO DETERMINE IF CHIT TO TAKE AS INSTALLED MEASUREMENT REQUIRED. ASSESSMENT STILL IN WORK.**

**ECD: LSFR**

# STS-126 LSRR

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## CARGO INTEGRATION HARDWARE STATUS

### DELIVERY STATUS

- ALL REQUIRED CIH HAS BEEN DELIVERED

### ISSUES/CONCERNS

- NONE



# **STS-126 Integrated Launch Site Requirements Review**

Presenter **Kenneth Nowak**

Date **12-13-07**

## **Backup Material**

### **FRWG Presentation (With Minor Changes)**



	Presenter	Shelby Lawson/MO3	
	Date	12/13/07	Page 5

# Flight Operations and Integration (FO&I)

**Flight Requirements:**  
**MIP, PIPs, CIP**  
**FDRD**  
**FRD**

**Backup Charts**



<b>STS-126/ULF2</b>		Presenter	Shelby Lawson/MO3
<b>Mission Requirements Status</b>		Date	12/13/07
		Page	6

Documentation	Status	ECD/Date
<u>MIP – NSTS 21514, Rev A</u>	CR-0003: Remove SBA, update LMC/middeck control weights, EVA scenarios, contingency landing cases	12/7 (A)
	CR-0004: Add GLACIER and update power table	12/12
	CR-000x: Remaining Appx. E inputs	Post LSRR
	CR-000x: Add Section 9 updates, SEITE	Post LSRR
	CR-000x: Update DTO/DSO/SDTO list	Post LSRR
<u>PIP – MPLM, Rev B, Chg 1 (8/2/07)</u>		
NSTS 21499	CR-0024: Remove T-0 services and replace EAFB w/DFRC & WSSH)	12/7 (A)
<u>PIP – SSPL 5510/PSSC, Basic (7/13/07)</u>		
NSTS 21539	CR-0002: Update PSSC PIP	12/7 (A)
<u>CIP- LMC, Rev B+Chg 1-7 (8/7/07) STS-126 Addendum</u>		
NSTS 21494	CR-0021: Remove SBA from LMC	12/7 (A)
<u>IP – DTO 848 TPS, Rev B (8/23/07)</u>		
NSTS 21517	CR-00X: Update STS-126 activities (no SBA on LMC)	Post CIR
<u>PIP- SEITE</u>		
NSTS-21542	CR-0001: Baseline Shuttle Exhaust Ion	(A) 11/19
<u>FDRD</u>	SO42013GZ: Add SEITE to STS-126 remove SSPL/PSSC from STS-326	01/10/08



<b>STS-126/ULF2 FRD Status</b>		Presenter <b>James Flores/USA</b>
Date	<b>12/13/07</b>	Page <b>7</b>

- **STS-126 FRD Latest Revision: 001, dated November 20, 2007**  
(<http://sspweb.jsc.nasa.gov/efrd>)

**CRs in work:**

- Update Middeck ascent control weight to 8600
- Add 2nd Hand Held Lidar
- Add SEITE Payload of Opportunity

- **STS-326 Latest Revision: Revision 001, dated November 30, 2007**  
(<http://sspweb.jsc.nasa.gov/efrd>)

**CRs in work:**

- Delete SSPL/PSSC Payload from STS-326

**CRs posted at <http://sspweb.jsc.nasa.gov/icbdata>**



## STS-400 Flight Requirements Status

Presenter  
Todd Hellner/Frank Richmond

Date 12/13/07

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### STS-400 HST Rescue Flight MIP (NSTS 21543):

- Recently approved MIP CR -0001
  - Baselined STS-400 MIP at IPT on 11/16/07
  - Yet to be posted to PILS – ECD 1/15/08

### Issues/Concerns:

- None Identified

### STS – 400 Latest FRD Revision

- Revision 001, Dated November 19, 2007 (<http://sspweb.jsc.nasa.gov/efrd>)

### Closed CRs

- FRD17462 – 400 – 004: Update Insertion Altitude

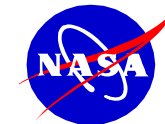
### Open CRs

- None

### CRs In Work

- Add STS-400 MIP References (when baselined)
- Numerous Editorial Changes Page 32 of 78
- STS-126 Driven Items (from CIR)





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# Boundary Layer Transition Flight Experiment

## STS-126

## PRCB

**M. Garske/MV6**

**L. Saucedo/MV6**

**C. Campbell/EG3**

**12/10/2007**



- There will be 4 flights to gather flight based science data on boundary layer transition at high mach numbers during Orbiter entry.
- This effort will play a major role in understanding boundary layer transition and influencing development of high-fidelity computational modeling techniques.
- The Orbiter is the one unique re-entry vehicle that can provide this very important information.
- This science data will benefit other aerothermodynamics interests within NASA.



- **Phase 1 - BLT experiment with a fixed protuberance to initiate Boundary Layer Transition at Mach numbers lower than 19 and to provide aero-heating data during Orbiter entry via new lower surface thermocouples.**
  - **The goal is to collect this data for 3 separate flights with incremental heights.**
    - **~0.25”, ~0.5” and ~0.75”**
    - **Sequential flights allow for flight envelope expansion approach to be used**
  - **Implementation on OV-103 & OV-105**
  - **NESC Funding via SSP will allow for augmented instrumentation**
    - **Nine on OV-105 and Ten on OV-103**
- **Phase 2 – BLT experiment with highly catalytic surface coating on an instrumented downstream tile**
  - **Protuberance height from flight 3 of phase 1**
- **Hardware Configuration**
  - **Tile Protuberance: Monolithic BRI-18**
    - **R&R Protuberance Tile between flights**
  - **Abandoned MADS wiring leveraged for Surface Thermocouples**
  - **Phase 2 catalytic coating targeted to be C742 (Utilized on STS 2,3 &5)**



- Preliminary Analysis
  - The 0.25” protuberance (first flight/STS-126) is a low risk to mission/safety of flight
    - The expected boundary layer transition trip is Mach 15 for the first flight. DAT assessments are validated up the mach 18
    - 0.25” protuberance has a low potential to be discriminator in a TPS damage/repair scenario requiring a contingency EVA for entry thermal concerns
      - Current inspection maps are valid
      - Protuberance location has large damage allowable in wedge location
      - Historically damages are limited in protuberance wedge location
      - SE&I PRA calculated risk for BLT zone is less than 1/10,000
      - Small heating difference between protuberance and baseline vehicle smoothness
  - Protuberance/tile can be removed late in the OPF flow if necessary
  - Preliminary testing
    - Impact testing
      - Foam testing completed and preliminary results look good
    - Arc jet testing
      - Preliminary CFD analysis performed. Testing scheduled for mid January 08
    - EVA tool testing
      - Protuberance removal method established – satisfactory results have been demonstrated
  - Preliminary Hazard analysis was developed by Boeing for PDR/SRR
  - Analysis of EVA access for contingency protuberance removal or zone tile repair was identified as feasible
- Engineering and manufacturing
  - Instrumentation layout finalized
  - Test tiles scheduled to be delivered for Arc Jet testing support
    - Some manufactured at KSC tile back shop for training
- KSC GO Planning and implementation schedule developed and agreed to
  - OPF Turnaround operational concepts developed



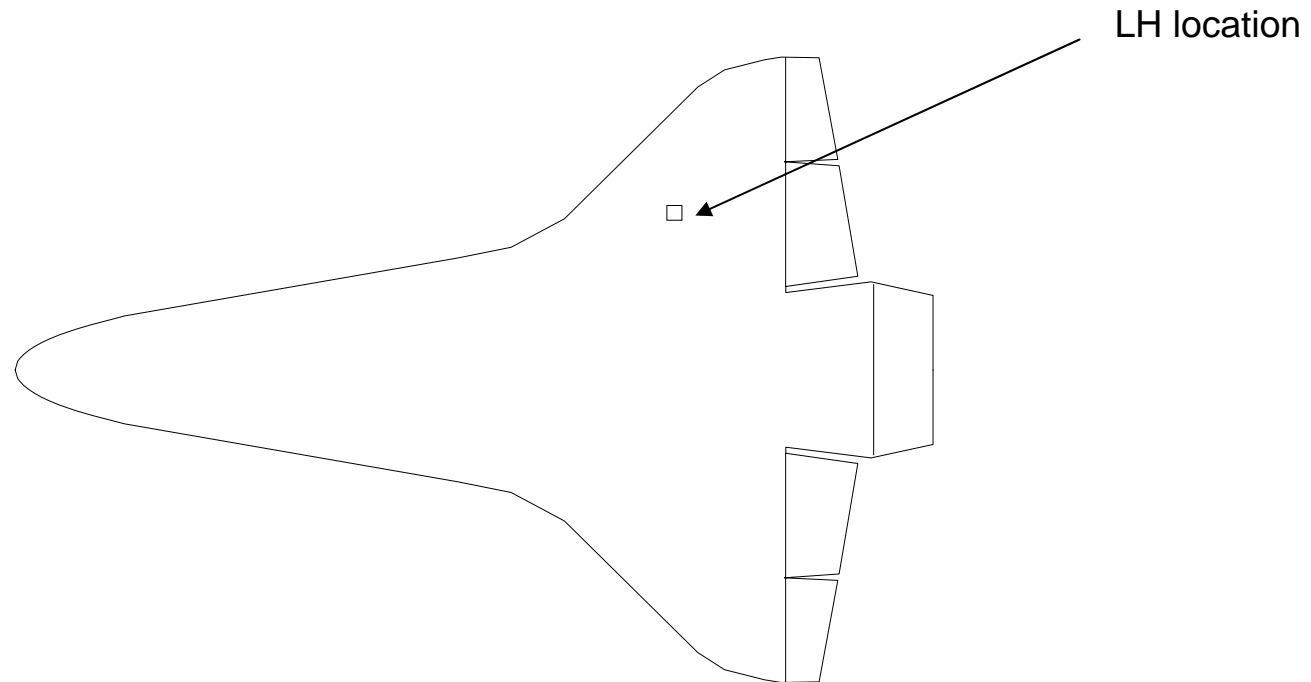
- **CDR planned for January, 2008**
- **Finish impact and arc jet testing**
- **Complete hazard analysis**
- **Deliver engineering and mod kits to KSC**
- **Complete aeroheating/thermal/stress integrated analysis for margins local to tile protuberance**
- **Complete Protuberance aero loads/stress analyses for tile protuberance load margins**
- **Deliver certification documentation**
- **Continue to engage other programs and organizations on utilization of science data**



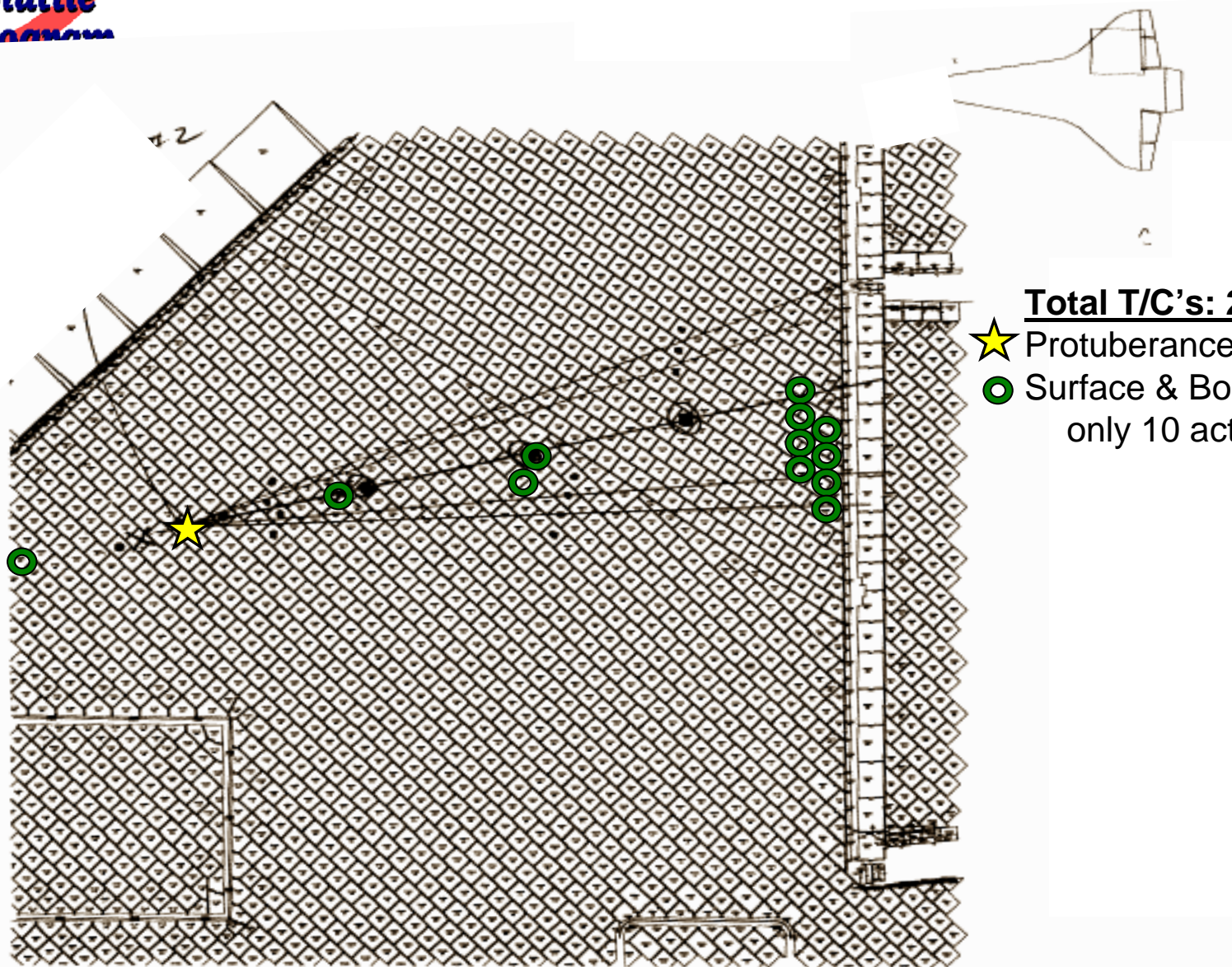
- Install suite of ten active thermocouple tiles on port underside wing
- Install protuberance just outboard and aft of MLG door (location detail in backup)

## Timeline

- **First Flight - Modify and install BLT FE hardware on OV-105 flt 22 (STS-126) for first flight with expected turbulent transition about Mach 15**
- **Second Flight – OV-105 flt 23 (STS-127), expected turbulent transition about Mach 18**
- **Third Flight – OV-103 flt 37 (STS-128), expected turbulent transition about Mach 19**
- **Fourth Flight – OV-105 flt 24 (STS-129), expected turbulent transition about Mach 19 with Catalytic coating material installed to gather catalytic/turbulent heating interaction data**
- **Two additional flights remaining on manifest thru end of Program (based on current manifest)**
  - **OV-103 flight 38 and OV-105 flight 25**
  - **Consider these two Additional flights as contingency flights for the BLT FE**



# Tile Locations



**Total T/C's: 2**

- ★ Protuberance Location
- Surface & Bond Line T/C (12)  
only 10 active at a time

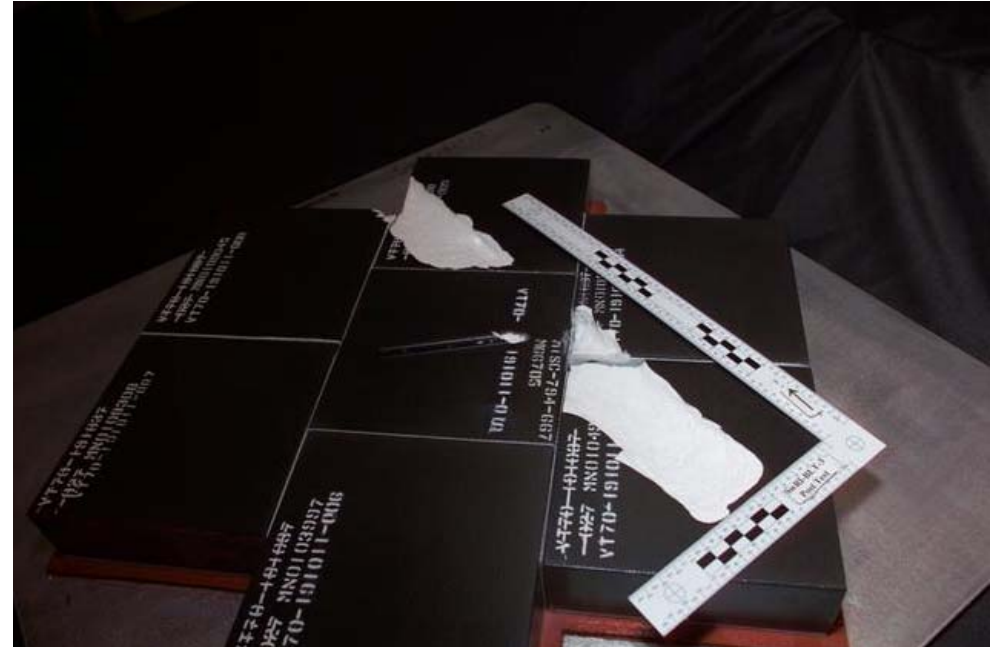




# Foam Impact Testing



Preliminary pictures from foam impact testing on BLT Protuberance tile performed at SwRI.  
BLT Protuberance tile is in the center.





# EVA Test for Removal





	Presenter MS2/Jim Peters
	Date Dec. 12, 2007   Page 1

# Debris Risk Assessment of Boundary Layer Transition Experiment

## DIG Assessment

James Peters, MS2  
Systems Engineering & Integration Office  
Space Shuttle Program Office



<h1>Debris Risk Assessment</h1>	Presenter MS2/Jim Peters
	Date Dec. 12, 2007   Page 2

- **Foam Debris:**
  - There is no transport to special tile, RCC or conditions for tile shear
  - The foam risk for the BLT Zone is less than 1/10,000 for tile (in other words, 10,000 simulations produced no critical damage)
    - Debris strikes to the BLT Zone are most likely from Intertank Popcorn Foam
    - Popcorn foam impacts are likely to produce low angle impacts (<5°) with low likelihood of critical damage
    - Performing more than 10,000 runs to determine a “better” estimate of the foam risk and risk difference would easily exceed the uncertainty of the modeling
  - “Arbitrarily” decreasing the tile capability by 25 percent in the BLT Zone would produce the same risk results (<1/10,000) as the impacts are driven by popcorn foam
- **Ice Debris:**
  - The umbilical and bellows ice has no transport to the BLT Zone
  - The worse case bracket has an overall tile risk of 1/30,000
    - The BLT Zone would be much lower than 1/30,000 and outside the uncertainty of the model in terms of risk level
- **Flight History:**
  - Impact history before RTF is not a good indicator of transport potential to the BLT zone because the debris environment has been greatly reduced since RTF
  - Since RTF, there have been 1093 hits to the bottom TPS and only 1 instance of impact noted in the BLT Zone
    - The impact recorded in the BLT zone was less than an inch
    - The flight history is consistent with the model prediction of low transport potential to the BLT Zone
- **Conclusion:** The BLT experiment is ideally located for minimal debris transport and debris risk and does not represent a risk increase within the capability of the model

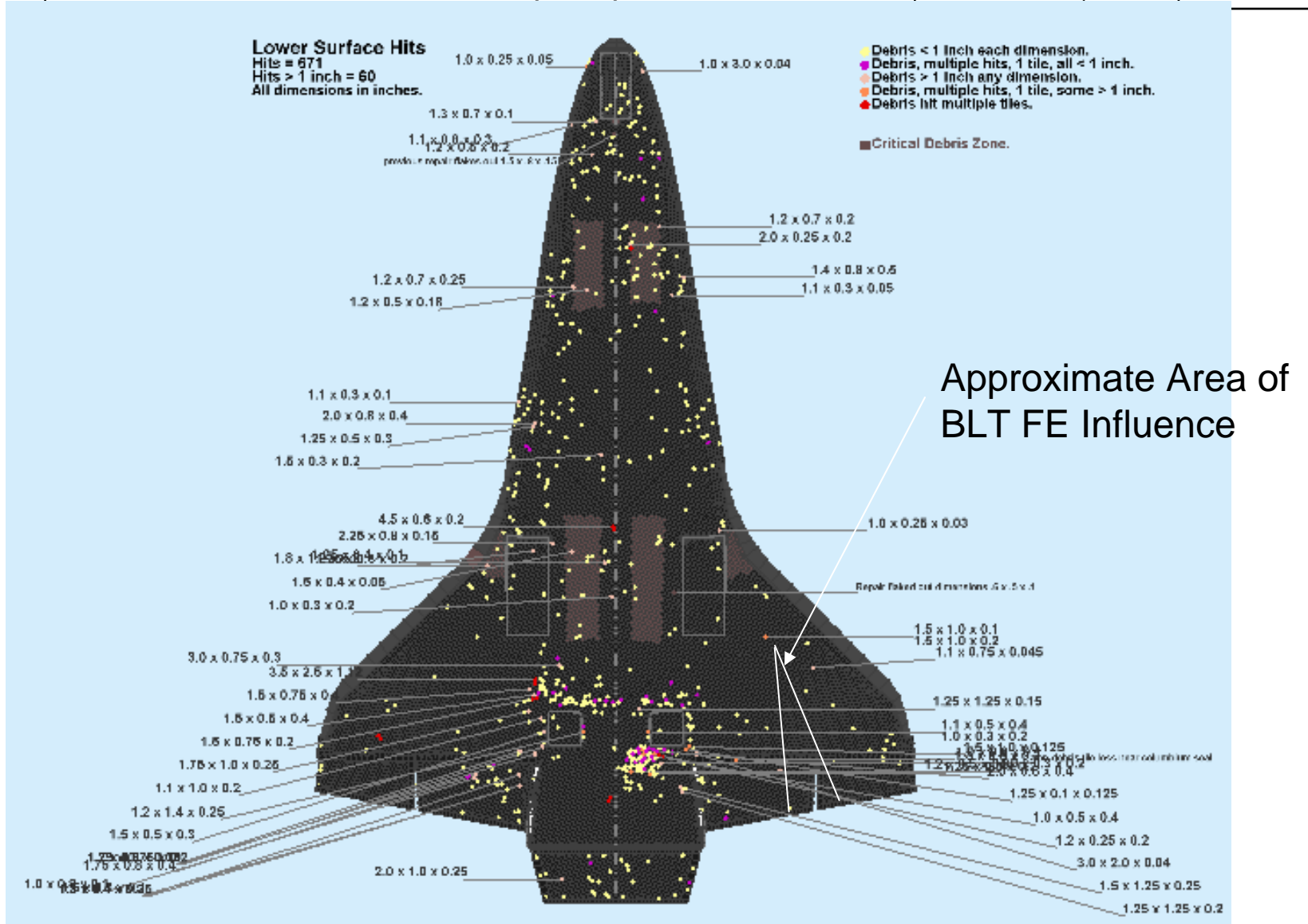


# Cumulative Data Since RTF

Source: KSC on-line Emaps Composite

Presenter: MS2/Jim Peters

Date: Dec. 12, 2007 | Page 3



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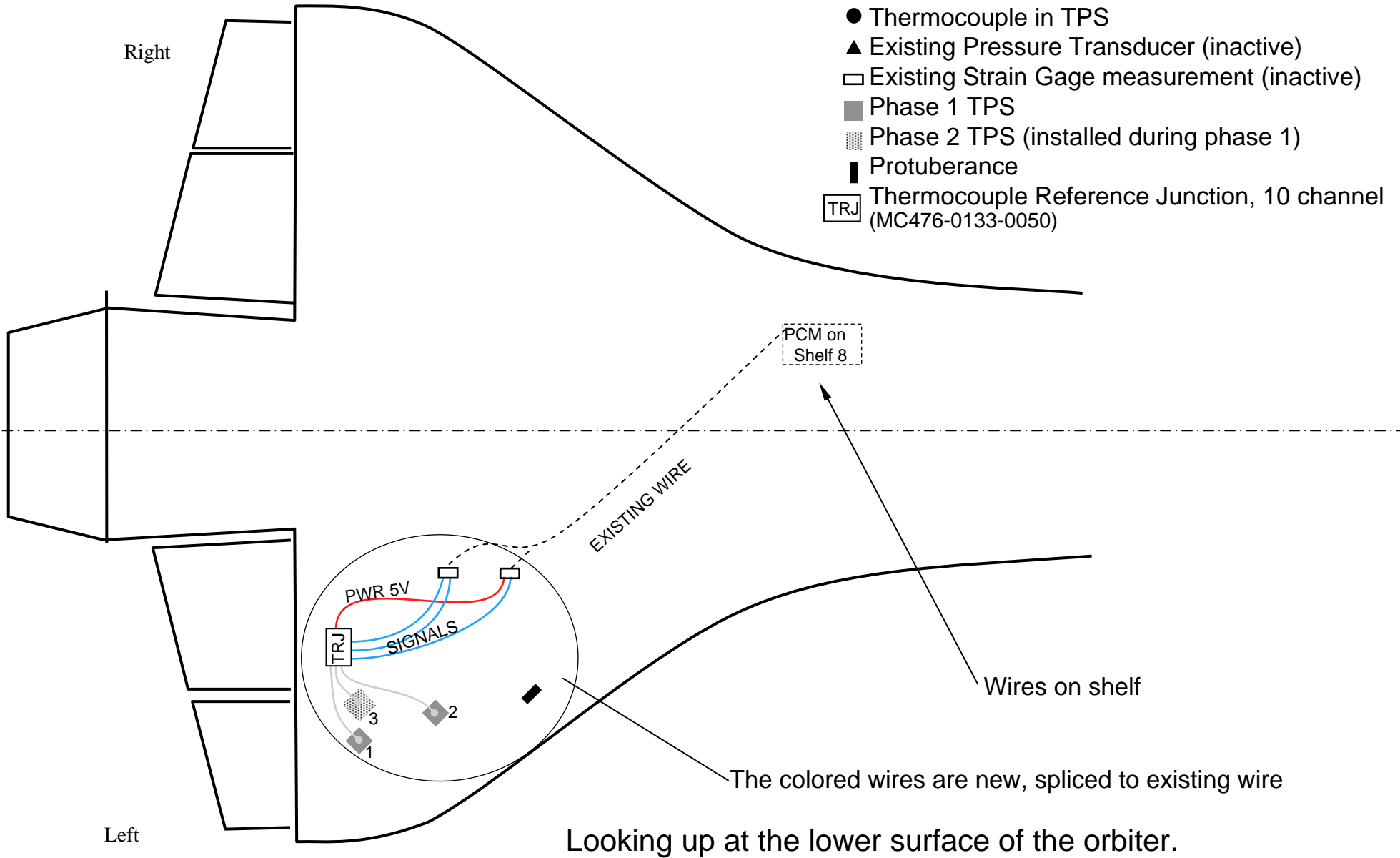
# Back-up

# Modifications Matrix

MCR NO.	MCR TITLE	KIT/ MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
<b><u>Mandatory to be Baselined at LSRR</u></b>				
30091	Boundary Layer Transition DTO	TCTIM1930091REF, 0002, 0 VK70-100055-001, 0105, 0 The MCR authorizes installation of tile with a protuberance and instrumentation to evaluate heating effects due to early boundary layer transition.	M072-784656 M070-191001	MECSLSI IMPACT
<b><u>Potential Mods</u></b>				
30121	Payload bay Floodlight Anode Reflector Mod	030121,0005,0 Placeholder Implements improved floodlight assembly with anode reflector to reduce heating effects and hopefully reduce bulb failures	M072-704000 MV0549A	MECSLSI IMPACT

# Boundary Layer Transition Mod DTO

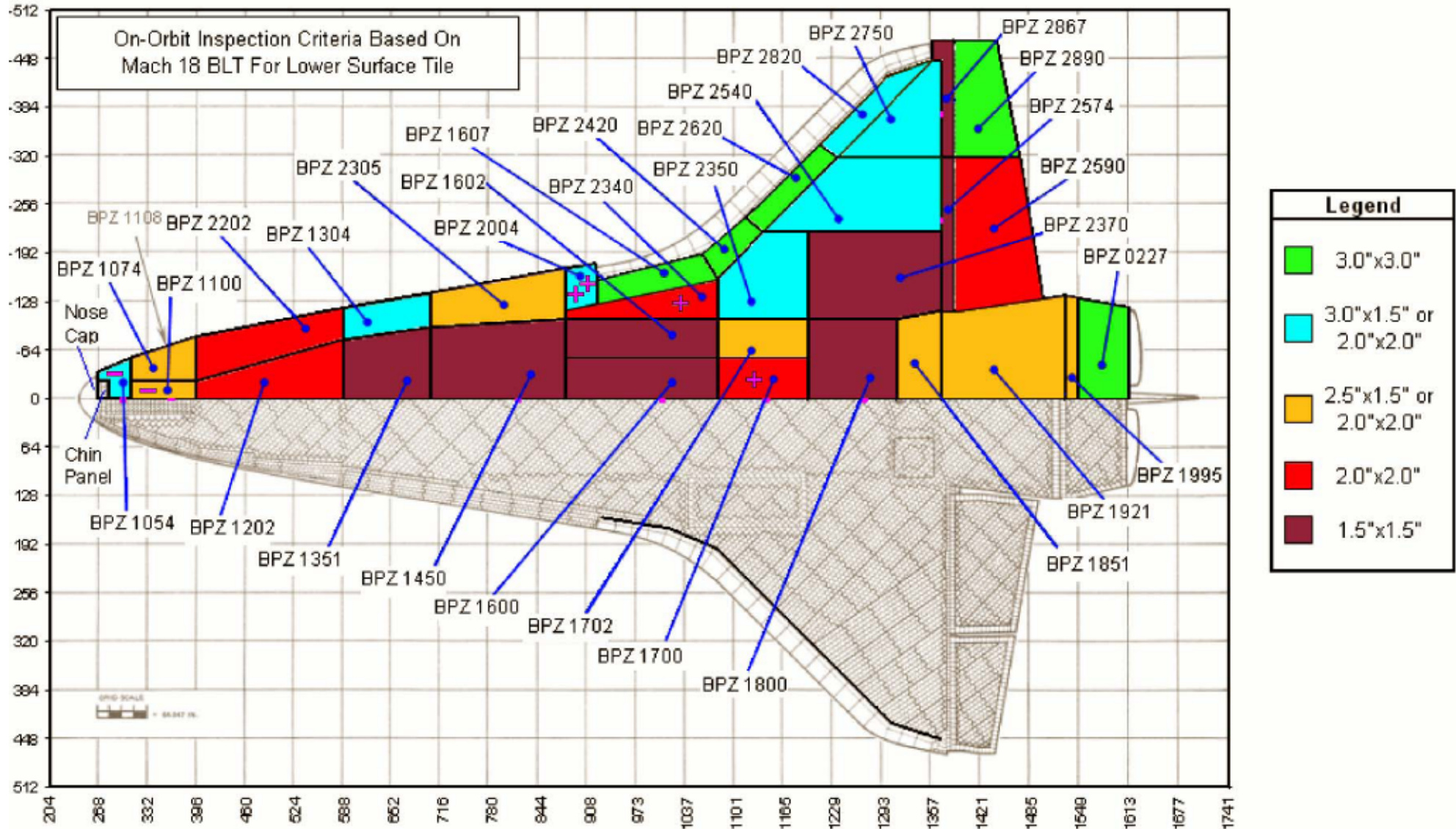
## OV-105 TPS Instrumentation





# Lower Surface Inspection Criteria based on Mach 18 Boundary Layer Transition

⊕ Compared To v2006.06 OOIC Map



# TPS Priorities - STS-126 LSRR

---

## Mandatory

- **Flight damage, OMRS Requirements/Chits, LRU access, & deferred work**
  - **Deferred work may be re-deferred with acceptable inspection**

Note: Gap Filler R&R – To be worked on a best effort Basis as resources allow. Mandatory GF areas: **Priority 1, 2A, 2B back to RCC #1 complete**

## Prioritized Opportunity






1. **BRI-18 Tile - MLGD (28 tile)**
  - 1<sup>st</sup> subset – fwd & o/b corner – 14/door **Complete**
2. **BRI-18 Tile - MLGD FWD Edge (22 tile)**
  - 2<sup>nd</sup> subset – fwd & o/b sides – 11/door **Complete**
3. **BRI-18 Tile - MLGD O/B Side (18 tile)**
  - 3<sup>rd</sup> subset – O/B side – 9/door outboard side **Complete**
4. **BRI-18 Tile - STR side of ET Doors (20 tile)**
  - 4th subset - ET doors - 10/door
5. **BRI-18 Tile - LESS Carrier Panels 8-10 (24 tile)**
  - 5th subset - LESS hot panels - 12/side
6. **BRI-18 Tile - STR side of ET Doors Inboard side Aft most tiles**

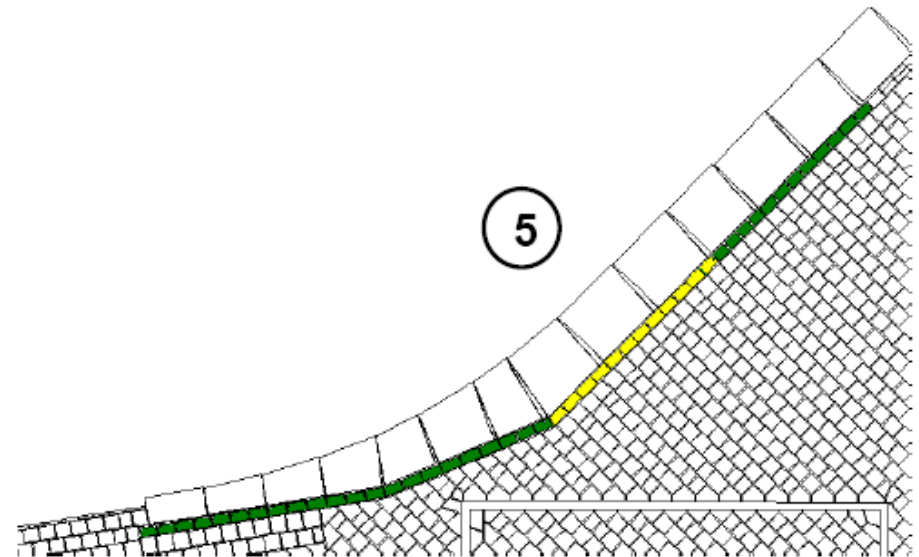
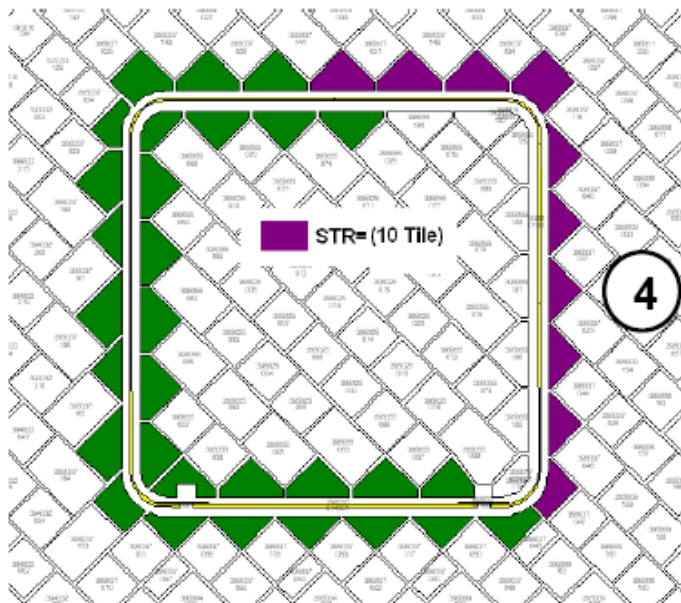
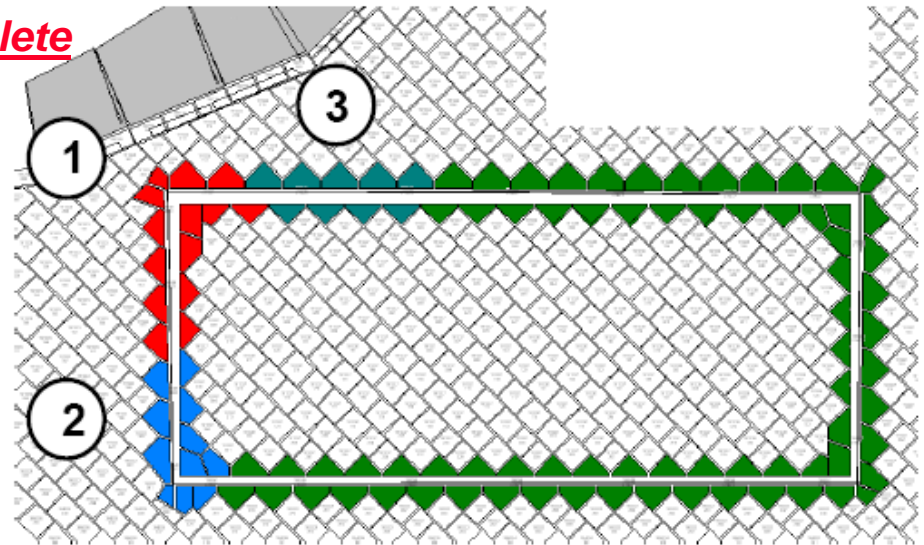
# TPS Priorities - STS-126 LSRR

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7. OMS Pod Tile/Fib Attrition Mod –6 tile per side with higher density substrate plus bond  
*Complete*
8. BRI-18 Tile - MLGD – Middle 1/3 – 12 tiles per side (6 door/6 structure), Outboard (1/3 left) – Inboard - Aft (in that order) –
9. Corrosion Sampling – Heatsink Areas (Elevons/Body Flap)
10. BRI-18 Tile – Remaining MLGD (Top Priority)/LESS carrier panels/window tiles/NLGD
  1. NLGD (attrition – do leading edge first) *Leading Edge Complete*
  3. LESS - panels 7, 6, 5, 11, 12, 13, 4, 3, 2, 1 (in that order)
    - No “forced” attrition – Insert/crack issue still being worked
    - Damaged tile will be assessed on a case by case basis by stress analysis
  4. Windows 2, 3, 4, & 5 Upper Carrier Panels
    - No “forced” attrition – Insert/crack issue still being worked
    - Damaged tile will be assessed on a case by case basis by stress analysis
  5. Window locations 1 & 6 Upper Carrier Panels 1<sup>st</sup>/Lower C/P’s 1 – 6 last
    - No “forced” attrition – Insert/crack issue still being worked
    - Damaged tile will be assessed on a case by case basis by stress analysis
11. Mod work (Hub Tile *Complete*, WLE sneak flow *Complete*, Horsecollar Gap Fillers *Complete*, MLGD sneak flow)
12. Remaining Gap Fillers (zone 2B areas aft of RCC #1 and zone #3)

# BRI-18 Top Risk Reduction Areas (Priorities 1-5)

1.  **MLGD- FWD/OB Corner** Complete
2.  **MLGD-(2A) Subset** Complete
3.  **MLGD-(2B) Subset** Complete
4.  **ET Doors- STR Side**
5.  **LESS "Hot Panels" (8-10)**





<b>STS-126 Launch Site Requirements Review</b>	<b>Presenter</b> MK-SIO / A. Swift	
	<b>Date</b> 12-13-07	<b>Page</b> 1

**Mandatory RCNs:**

**NONE**

**Non-Mandatory Value Added RCNs:**

**NONE**

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# **STS-126/STS-326/STS-400 Launch Site Requirements Review Flight Software Overview**

**Tom Stansel**

**PRCB 12/13/07**

# STS-126 LSRR (FSWE)

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- **STS-126/OV-105 is the First Scheduled Flight of Operational Increment (OI) 33 Flight Software (FSW)**
  - SASCBC SCR 98100A documents PASS and BFS OI-33 content
- **STS-126/OV-105 Flight Software Payload Support:**
  - ULF-2
  - Orbiter Interface Unit (OIU)
  - Sequential Still Video (SSV)
  - Orbiter Docking System (ODS)
  - Trajectory Control System (TCS)
  - Multi-Purpose Logistics Module (MPLM)
  - 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-126 LSRR (FSWE)

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- **STS-126 Source Changes/Edits for Primary Flight Software (Base)**
  - SCR 93215A - Protect Ascent Bearing Spec From MM 104 Retrograde Guidance Solution
  - DR 124995 - Runway Label not Displayed Above Runway
    - Approval planned for 12/13/07 SASCB
  - DR 124997 - Wrong DEU for Spec 54 Auto Ascent to Entry Bearing Switch
    - Approval planned for 12/13/07 SASCB
  - DR 126184 – Erroneous Data Values after Decouple Build
    - SASCB approval TBD
- **STS-126 Patch/Edit Implementation for Backup Flight Software (Base) (included on delivered Mass Memory)**
  - None



# STS-126 LSRR (FSWE)

---

- **Products**

- **STS-126/OV-105 Base Cycle Product delivery schedule (available to field)**  
**FPSB**
  - **Shuttle Data Tape** Feb. 1, 2008
  - **Mass Memory** Feb. 18, 2008 (Under Review)
- **STS-326/OV-105 deliveries will consist of the STS-123 OV-105 Base SDT/Mass Memory, STS-323 Flight Specific I-Loads and post call-up changes if required**
  - **Living SCR 98096 Mod C, defining the Rescue LON Flight Software configuration for OV-105 (STS-326) is scheduled for approval at the January 31, 2008 SASCB**
- **STS-400/OV-105 deliveries will consist of the STS-123 OV-105 Base SDT/Mass Memory, STS-400 Flight Specific I-Loads and post call-up changes if required**
  - **Living SCR 98096 Mod C, defining the Rescue LON Flight Software configuration for OV-105 (STS-400) is scheduled for approval at the January 31, 2008 SASCB**
  - **STS-400 Flight Specific I-Loads scheduled for SASCB approval on March 13, 2008**

# STS-126 LSRR (FSWE)

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- **Open Items**
  - None
- **Concerns/Issues**
  - No issues or concerns with STS-126, STS-326 or STS-400 at this time



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NASA Johnson Space Center, Houston, Texas



<b>STS-126 LSRR FLIGHT CREW EQUIPMENT/GFE</b>	<b>Presenter</b> Kenneth Brown	
	<b>Date</b> December 13, 2007	<b>Page</b> 1

## STS-126 LSRR FCE/GFE Status

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



# SPACE SHUTTLE PROGRAM

## Orbiter Project Office

NASA Johnson Space Center, Houston, Texas



<b>STS-126 LSRR FLIGHT CREW EQUIPMENT/GFE</b>	
---	--

Presenter Kenneth Brown	
Date	December 13, 2007
Page <b>2</b>	

- Delivery dates are partnered
  - Delivery dates shown are already delivered h/w or transferred from STS-124 for STS-400 and STS-126.
    - For STS-326 some hardware may be pulled from STS-125.



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## STS-126 LSRR FLIGHT CREW EQUIPMENT/GFE

Presenter  
Kenneth Brown

Date December 13, 2007 Page 3

# BACKUP



# SPACE SHUTTLE PROGRAM

## Orbiter Project Office

NASA Johnson Space Center, Houston, Texas



### STS-126 LSRR FLIGHT CREW EQUIPMENT/GFE

Presenter  
Kenneth Brown

Date December 13, 2007 Page 4

Hardware	Tech Order	KSC Eng Need	Eng(TO) Release	Cert O/C	KSC Need	JSC Planned	JSC Remarks	JSC Contact
A (port forward)	M072-750025-080	4/23/08		O	5/23/08	5/23/08	For STS-400 and STS-126 hardware from STS-124 For STS-326, h/w from STS-125.	Randall Moore
B (port aft)	M072-750025-081	4/23/08		O	5/23/08	5/23/08	For STS-400 and STS-126 hardware from STS-124 For STS-326, h/w from STS-125.	Randall Moore
C (starboard aft)	M072-750025-082	4/23/08		O	5/23/08	5/23/08	For STS-400 and STS-126 hardware from STS-124 For STS-326, h/w from STS-125.	Randall Moore
D (starboard forward)	M072-750025-083	4/23/08		O	5/23/08	5/23/08	For STS-400 and STS-126 hardware from STS-124 For STS-326, h/w from STS-125.	Randall Moore
Payload Ops camera	M072-340109-002	4/18/08		O	5/19/08	5/19/08		Randall Moore
SRMS elbow camera	M072-544504-009	4/23/08		O	5/23/08	5/23/08	For STS-400 and STS-126 hardware from STS-124 For STS-326, h/w from STS-125.	Randall Moore
SRMS wrist camera	M072-544504-010	4/23/08		O	5/23/08	5/23/08	For STS-400 and STS-126 hardware from STS-124 For STS-326, h/w from STS-125.	Randall Moore
Centerline Airlock Camera (stowed)	M072-660828-002, CCCD			C			On-dock	Randall Moore
Lefthand Umbilical Camera (aft)	M072-705001-016	6/6/08		C	07/07/08	07/07/08	For STS-400 and STS-126 hardware from STS-124 For STS-326, h/w from STS-125.	Randall Moore



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NASA Johnson Space Center, Houston, Texas



<b>STS-126 LSRR FLIGHT CREW EQUIPMENT/GFE</b>		Presenter Kenneth Brown
		Date December 13, 2007 Page <b>5</b>

Hardware	Tech Order	KSC Eng Need	Eng(TO) Release	Cert O/C	KSC Need	JSC Planned	JSC Remarks	JSC Contact
Righthand Umbilical Camera	M072-705001-028	06/06/08		O	07/07/08	06/19/08		Randall Moore
Digital Television (DTV)	M072-710570-007		3/07/00	C			Installed hardware.	Randall Moore
MCIU/RMS Situational Awareness Display (RSAD)	M072-710543-001		03/07/00	O			Installed hardware.	Larry Schmidt
Portable Foot Restraint (PFR)	M072-661568-029		03/11/05	C	05/05/08	05/05/08		Sandy Peterson
Tools for Rendezvous and Docking (TRAD)	M072-730021-020			O			Installed hardware.	Larry Schmidt
Tool Stowage Assembly (TSA)	M072-660853-002 M072-660850-005	10/01/07	4/21/08	C	5/21/08	5/21/08		Sandy Peterson
Video Processing Unit (VPU)	M072-710338-006		07/05/01	C			Installed hardware.	Larry Schmidt
Winches	V070-650007-085		11/19/04	C			Installed hardware.	Sandy Peterson



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NASA Johnson Space Center, Houston, Texas



### STS-126 LSRR FLIGHT CREW EQUIPMENT/GFE

Presenter  
Kenneth Brown

Date December 13, 2007 Page 6

Hardware	Tech Order	KSC Eng Need	Eng(TO) Release	C e r t i f i c a t e d	KSC Need	JSC Planned	JSC Remarks	JSC Contact
Wireless Video System (WVS)	M072-744007-001 UHF M072-344828-001 mount M072-744004-013 S-BAND M072-744004-014 S-BAND M072-744004-012 S-BAND M072-744004-015 S-BAND M072-744004-017 S-BAND M072-744004-018 S-BAND M072-744004-016 S-BAND			C			Installed hardware.	Randall Moore
Space to Space Orbiter Radio (SSOR)	M072-344828-002 M072-740828-002 antenna			C			Installed hardware.	Larry Schmidt
RMS Sideview Camera (RSC)	M072-710281-002 M072-000416-004 camera	05/07/08	11/24/04	C	06/07/08	06/02/08		Randall Moore
Wing Leading Edge (WLE) Instrumentation - Left Wing**	M072-7561111-005			O	5/12/08	5/12/08		Gary Cox
Wing Leading Edge (WLE) Instrumentation - Right Wing**	M072-7561111-006			O	5/12/08	5/12/08		Gary Cox
SCU	M072-661606-012			C			Installed hardware.	Sandy Peterson
OBSS Sensor Package 2	M072-710282-006	4/18/08		O	5/19/08	5/19/08		Larry Schmidt
Airlock Adapter Plate				O			Installed hardware.	Sandy Peterson





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<b>STS-126 LSRR FLIGHT CREW EQUIPMENT/GFE</b>		Presenter Kenneth Brown
		Date December 13, 2007 Page <b>7</b>

Hardware	Tech Order	KSC Eng Need	Eng(TO) Release	Cert O/C	KSC Need	JSC Planned	JSC Remarks	JSC Contact
RMS				O			Installed hardware.	Kenneth Ruta
WLE firmware upgrade	M072-756111			O	5/12/08	5/12/08		Gary Cox
OBSS Sensor Package 1	M072-710282-008	4/18/08		O	5/19/08	5/19/08		Randall Moore



# **EVA Status**

## **STS-126/ULF-2 Launch Site Readiness Review**

**XA/Maria Tullar  
Johnson Space Center  
December 13, 2007**



- **Bulkhead PFR – SED33105308-307**
  - Bulkhead PFR installation – Tech Order: M072-661568-029
  
- **Winches**
  - Forward Winch, SED33101570-327
  - Aft Winch, SED33101570-325
  
- **Port LWTSA**
  - Port LWTSA installation – Tech Order: M072-660850-005
  - Port LWTSA Tools installation – Tech Order: M072-660853-002 (launch)/003 (return)
  
- **Starboard LWTSA**
  - Starboard LWTSA Installation – Tech Order: M072-660850-006
  - Starboard TSA Tool Installation – Tech Order: M072-660852-019 (launch)/020 (return)



# STS-126 Integrated Launch Site Requirements Review

Presenter **Kenneth Nowak**

Date **12-13-07**

## 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



# STS-126 Integrated Launch Site Requirements Review

Presenter **Kenneth Nowak**

Date **12-13-07**

## SSP System Drawings

The Drawings Baseline Was Released By PRCB S072126 on 08-15-07

- V072-000001-276 (Rev. TBD) Space Shuttle System (Rel. TBD)
  - V072-200206-001 (Rev. NC) Mission Equipment Cargo Support (Rel. 11-15-07)
  - SGD32104449-501 (Rev. TBD) Crew Compartment Configuration (Rel. TBD)
    - 502 Descent
  - V070-000001-005 Orbiter General Assembly
    - V070-410100-018 SSME Installation
  - 10100-0001-172 Integrated SRB General Assembly (BI-136)
  - 80901000000-529 External Tank Assembly (ET-129)
- STS-126 LSRR + 18 days Mission Configuration Product Plan (MCP) was last published on 12-31-07 and will be republished at CIR +70 days on 02-11-08.



# STS-126 Integrated Launch Site Requirements Review

Presenter **Kenneth Nowak**

Date **12-13-07**

## SSP System Drawings - Cont'd

### Ferry Configuration

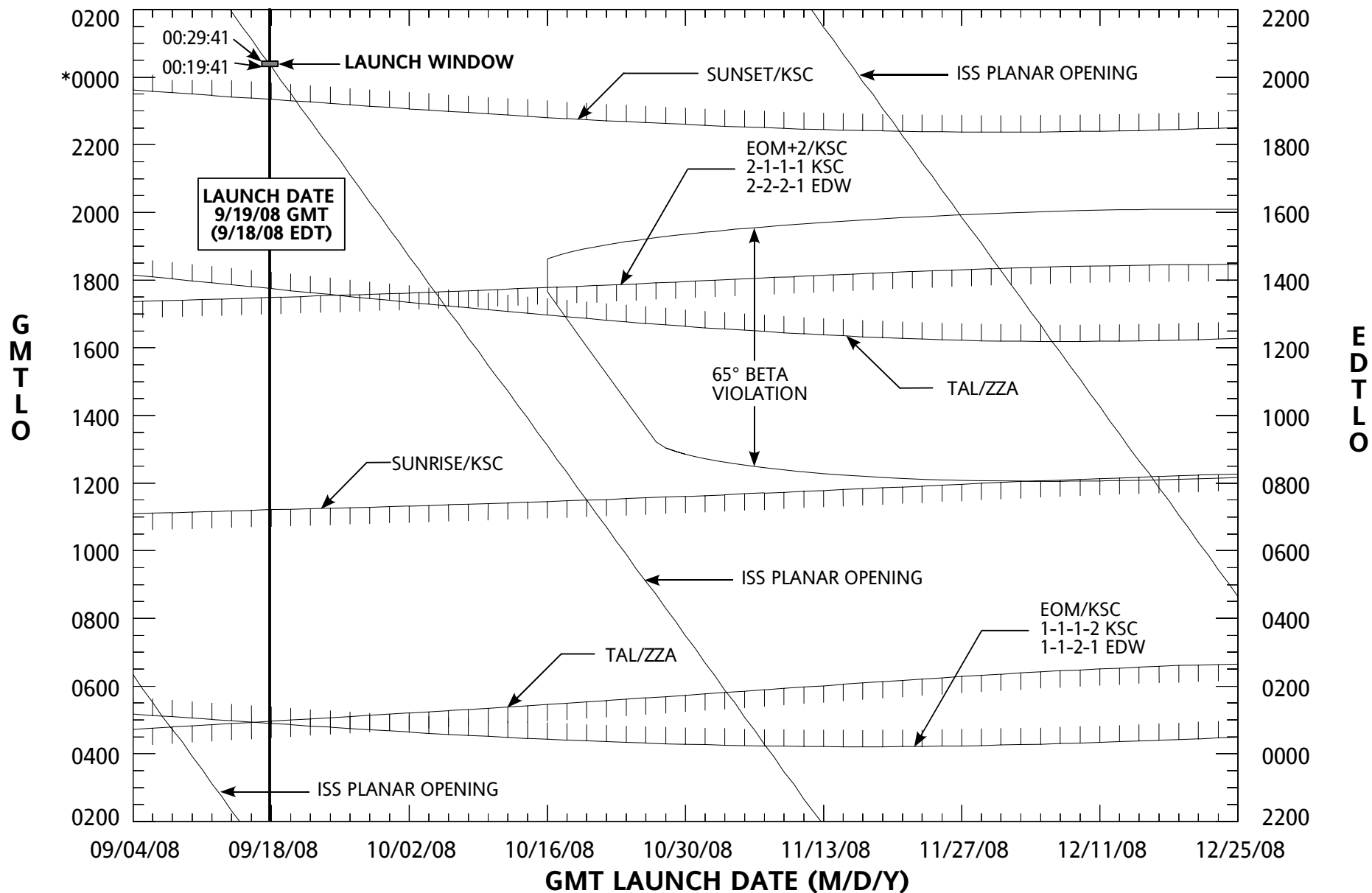
- V072-000001-277 (Rev. TBD) Space Shuttle System Drawing (Rel. TBD)
  - V072-2002006-002 (Rev. NC) Mission Equipment Cargo Support (Rel. 11-15-07)
  - SGD321004449-001 (Rev. TBD) Crew Compartment Configuration (Rel. TBD)
  - V072-300055-014 (Rev. BM) Ferry Flight Configuration (Rel. 07-24-07)

**SCA 905**

Mission Duration = 15+1+2  
 Inclination = 51.6°  
 OMS2 ha/hp = 124 x 85 nmi.  
 Target ha/hp = 195 x 184 nmi.

## STS-126 OCF LAUNCH WINDOW

C. Osgood/USH-483L  
 M. Jamroz/USH-483L  
 October 9, 2007



Note: EOM lighting lines, based on an OMS2 phase angle of 278 deg, are representative only.  
 The ISS beta angle ( $|\beta| < 65^\circ$ ) for mated operation is beginning 08:30:00 MET (FD3 Rendezvous) and ending ~ 13:15:19:00 MET  
 \* Indicates the dateline. Launch times above this point are on subsequent days from the date indicated on the corresponding date axis.



# STS-126 Integrated Launch Site Requirements Review

Presenter **Kenneth Nowak**

Date **12-13-07**

## Modification Impact Report

- **Mission Equipment Modifications and Orbiter Modifications analyzed for impacts to OMRSD, LCC, ICD, EMI, Software, and GSE.**
- **A total of 2 MCR/TADs have been approved and/or pending mods**
- **Current MCR/TAD impact status:**
  - **No impacts for all six disciplines** **1**
  - **One or more disciplines with impacts, documentation approved** **0**  
**and/or pending approval**





# STS-126 Integrated Launch Site Requirements Review

Presenter **Kenneth Nowak**

Date **12-13-07**

## Modification Impact Report

- Possible impacts still under review
- MCR 30121 (OMRSD impact)

**1**

MCR/ECP	STAT SITE	ITEM/KIT NUMBER TCTI NUMBER	EISN	SEQ NO.	DESCRIPTION / GENERAL REMARKS	PRCB AUTHDATE	PRIO FLT
	AUTH KSC	J5765	0105	001	WSB POST FLIGHT TANK OFFLOAD QUANTITY	ORB-0077 B 2005-03-09	MAND 022
	AUTH KSC	J6295	0105	001	OV-105 IR THERMOGRAPHY REQUEST	S-J6295 2007-11-07	MAND 022
	AUTH KSC	J6306	0105	001	OV-105 MID FUSELAGE LOCK BOLT INSPECTION	S-J6306 2007-11-27	MAND 022

TOTAL MODS = 3

Approved STS-126 OMRS Waivers and Exceptions

WVR EXC	ELEMENT PROJECT	PRCBD NUMBER WAIVER# (STAT) (INITIAL STS)		ABSTRACT RAS REQUIREMENTS	EISN PAYLOAD	STS BEG END
+	E	ORB	S053296PJ EK10261 (A)	OMRSD EXCEPTION REQUEST - WING LEADING EDGE RCC PANEL REFURBISHME NT(EK10261)	105	019 023
	W	ET	S053293FZ WK03850R1 (A) (STS-093)	L02/LH2 TANK PRESSURE MONITOR FOR MOVE	ET	099 999
		OMS	S053294ZV WK10093 (A)	OMRSD WAIVER REQUEST - OMS HEATER RESISTANCE (WK10093)	0024	024 031
			S053296UN WK10301R1 (A)	OMRSD WAIVER REQUEST - LOMS HELIUM ISOLATION VALVE LEAKAGE (WK103 01R1)	0013	031 034
		ORB	S053296LJ WK10240 (A)	OMRSD WAIVER REQUEST - WSB 2 GN2 REG PRESS BELOW OMRSD (WK10240)	105	018 026
			S053298TA WK10538 (A)	OMRSD WAIVER REQUEST - MODULAR AUXILIARY DATA SYSTEM FREQUENCY DI VISIONMULTIPLEXER 1 FREQUENCY CALIBRATIONOV- 105 (WK10538)	105	020 026
			S053298TB WK10540 (A)	OMRSD WAIVER REQUEST - MODULAR AUXILIARY DATA SYSTEM FREQUENCY DI VISIONMULTIPLEXER 2 MUX CH. 1 DATA SHIFT OV-105 (WK10540)	105	020 026

RCS      S053296DC      OMRSD WAIVER REQUEST -      0024      025 030  
           WK10138 (A) RRCS FUEL HELIUM REGULATOR  
                                 LEAKAGE (WK1013 8)

          S053296PV      OMRSD WAIVER REQUEST -      0024      026 034  
           WK10275 (A) RRCS FUEL A& B LEG REG  
                                 LOCKUP PRESSURE(WK 10275)

SRB      S053293WA      LH FWD AND RH MID SRB      BI      099 999  
           WK03886 (A) JOINT TEMP SENSORS  
           (STS-103)

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 1

Date: 12/04/07 07:37

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Page: 2

FLIGHT-SPECIFIC

Approved STS-126 OMRS Waivers and Exceptions

	Waivers	Except	Deviat	Cannib	Total
Total Extracted	9	1	0	0	10

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ACTIVE WAIVERS FOR  
OV-105

Item #	Authority	Date	Waiver Description	Effectivity	Wad
53	S052428A	03/27/91	Allows specified flights to fly with interim TPS repair after each mission to minimize damage to surrounding tile during ferry flight	STS-37, STS-39, STS-40, STS-42 thru STS-999	<b>STAYS OPEN</b>
101	S076972	11/19/91	Permit the modified GPCs (AP101-S) Battery Back-up Unit to fly with annotated fastener improvements without rolling the LRU Part Number	STS-42, STS-44, STS-47 and STS-49 thru STS-999	<b>STAYS OPEN</b>
341	S063701	08/07/07	<p>The following requirement is waived to allow OV-105 to fly with the following out-of-configuration condition:</p> <p>Partial installation of Tech Order M072-660010-004, Middeck Air Flow Re-routing Duct Tech Order, not to include bolt (NAS1003-8A) and washer (NAS620C10) in the lower aft corner of the vent housing cover assembly.</p> <p>During vertical stowage the nut plate (not under USA Tech Order configuration controlled) was noted missing from behind the starboard closeout panel. Without the nut plate, the bolt and washer cannot be installed. The area cannot be currently accessed to re-install the missing hardware. (NOTE: MRB in work on PR FCS-5-20-0476 to approve use of tape on the open hole. Lost and found PR LAF-5-20-0440 written to document lost nut plate.</p>	OV-105, Flight 20	

**VEHICLE LIMITED LIFE STATUS REPORT**

PRELIMINARY SUBMITTED 12/03/2007

NO.	SYS	REQT / PART DESC / PART NO	TOP / SEPAR	ANTICIPATED ACTION	CONSTR	ELE
1	PYRO	C00AA0.010.134 PRESS. CART - DRAG CHUTE SED26138200-301 Lot HYN	TPS-TBD SEPAR -TBD	RECERT SCHEDULED FOR 03/08	2	O
2	PYRO	C00AA0.010.135 REEFING LINE CUTTER SED26139100-701 Lot HWJ	TPS-TBD SEPAR -TBD	RECERT SCHEDULED FOR 03/08	2	O
3	PYRO	C00AA0.010.136 ODS MECHANISM MC621-0087-6001	TC07-080	RECERT IN WORK	2	O
4	ECLSS	C00AA0.030.007 PPO2 SENSOR MC250-0002-3165	SEPAR-TC07-116	EXPIRES 06/01/08	4	O
5	RCS	C00AA0.070.001 FUEL RELIEF VALVE MC284-0421-0012	SEPAR-TC07-119	EXPIRES 09/26/08	2	O
6	RCS	C00AA0.070.001 OXID RELIEF VALVE MC284-0421-0011	SEPAR-TC07-119	EXPIRES 10/30/08	2	O
7	PYRO	C00AA0.110.032 NASA STANDARD DET. SEB26100094-201	V5032.004 V5029.001	REMOVE/INSTALL	2	O
8	PYRO	C00AA0.110.033 CARTRIDGE SKD26100098-301	V5032.004 V5127	REMOVE/INSTALL	2	O
9	PYRO	C00AA0.110.034 AFT ATTACH BSTR CART. SKD26100099-401	V5032.004 V5029.001	REMOVE/INSTALL	4	O
10	PYRO	C00AA0.110.035 NLG THRUSTER CART. SKD26100100-301	V5032.004 V5127	REMOVE/INSTALL	2	O
11	PYRO	C00AA0.110.036 CARTRIDGE-NLG THRUSTER SKD26100101-301 Lot HNF	TPS-TBD SEPAR -TBD	RECERT SCHEDULED FOR 01/08	2	O

## Constraints

1=ET/SRB MATE    3=VAB ROLL  
2=OPF ROLL      4=LAUNCH

## Elements

O=ORBITER  
M=MISSION EQUIP.

### VEHICLE LIMITED LIFE STATUS REPORT

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12	PYRO	C00AA0.110.040 T-HANDLE INITIATOR SKD26100108-302 Lot NKA	TPS-TBD SEPAR -TBD	RECERT SCHEDULED FOR 01/08	2	O
13	PYRO	C00AA0.110.043 GAS PRESS CTG. SEB26100001-25X	V5056	INSTALL	4	O
14	PYRO	C00AA0.115.001 GAS SAMPLER BATTERY SED33101116-321	V5012.001 V5029.004	REMOVE/INSTALL	4	O
15	INS	C00AA0.140.004 MADS TAPE RECORDER ME435-0055-0003 THRU 0005	S0007 V1200 V1248	TEST	4	O
16	COM	C00AA0.160.001 GPS RECEIVER (GPS MAGR'S) MC478-0153-0001	V5A71 SEPAR-TBD	R/R BATTERIES EVERY 12 MONTHS	4	O
17	MEQLG	C00AB0.010.003 NLG TIRE MC194-0007-0006 (2)	V1165.003 V1165.004	REMOVE/INSTALL	2	O
18	MEQLG	C00AB0.010.004 MLG TIE BOLTS & NUTS MC621-0051-0038 (4 WHEELS)	V1165.001 V1165.002	REMOVE/INSTALL	2	O
19	MEQLG	C00AB0.010.005 MAIN WHEEL ASSEMBLY MC621-0051-0038 (4)	V1165.001 V1165.002	REMOVE/INSTALL	2	O
20	MEQLG	C00AB0.010.006 NOSE WHEEL ASSEMBLY MC621-0050-0004 (2)	V1165.003 V1165.004	REMOVE/INSTALL	2	O
21	PVD	C00AB0.100.006 WCCS DESICCANT CANNISTER V070-381120-XXX	SEPAR-TC07-117	2 FLIGHTS MAX	2	O
22	PVD	C00AB0.100.007 WCCS DESICCANT CANNISTER V070-381128-XXX	SEPAR-TC07-117	2 FLIGHTS MAX	2	O

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**VEHICLE LIMITED LIFE STATUS REPORT**

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23	PVD	C00AB0.100.008 WCCS DESICCANT CANNISTER V070-383146-XXX	SEPAR-TC07-117	2 FLIGHTS MAX	2	O
24	PLM	C00AB0.160.019 TRAJECTORY CONTROL SENSOR FLT KIT SJD39123429-305	TPS-TBD SEPAR-TBD	REMOVE/REFURB/INSTALL	2	M
25	PLM	C00AB0.160.020A VIDEOSPECTION CAMERA ASSY SED39125120-310	TPS-TBD SEPAR TBD	REMOVE/REFURB/INSTALL	4	M
26	TPS	C00AB0.170.001 RCC ARROWHEAD PLATE MC621-0007-7009	V5139.001 V5139.002	REMOVE/INSTALL	2	O
27	TPS	C00AB0.170.002 RCC ARROWHEAD PLATE MC621-0007-7010	V5139.001 V5139.002	REMOVE/INSTALL	2	O
28	ECLSS	C00AB0.230.100 AV/BAY FIRE ETINGUISHER MC250-0002-3165	SEPAR-TC07-118	EXPIRES 05/02/08	4	O
29	PYRO	C00AD0.030.009 SPHERICAL BEARING ASSY V070-562036-002	V5032.004 V5127	REMOVE/INSTALL	2	O
30	PYRO	C00AD0.030.012 PYRO CENTERING MECHANISM SKD26100098-501	V5032.004 V5127	REMOVE/INSTALL	2	O
31	PLM	C00EB0.050.001 EVA CABLE STOWAGE UNIT V725-714056-001	TPS-TBD SEPAR-TBD	REMOVE/REFURB/INSTALL	2	M
32	PLM	JSC24937.30 PORTABLE FOOT RESTRAINT ASSY SED33105308-307	TPS-TBD SEPAR-TBD	REMOVE/REFURBISH/INSTALL	2	M
33	PLM	JSC24937.53 ERCM SAFETY TETHER (2) SED33105087-315	TPS-TBD SEPAR-TBD	REMOVE/REFURBISH/INSTALL	2	M

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# VEHICLE LIMITED LIFE STATUS REPORT

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34	FCS	JSC24937.56 EMER EGRESS SLIDE SYS MC623-0015-0023	TPS-TBD	REMOVE/INSTALL	4	M
35	ECLSS	V61AIL.010-C LIOH CANNISTER MC621-0008-0409	TPS-TBD	INSTALL AT PAD	4	O
36	ECLSS	V61AIL.015-C HYDRAZINE (CO RMVL CART.) MC621-0008-0060	TPS-TBD	INSTALL AT PAD	4	O
37	ECLSS	V61AIL.016-C ATCO CARTRIDGE MC250-0024-0001	TPS-TBD	INSTALL AT PAD	4	O
38	ECLSS	V61AJ0.141 PPO2 SENSOR MC250-0002-3165	V1053.010	RECALIBRATE SENSORS AT PAD	4	O
39	FCS	V66AIL.060 POLE CREW ESCAPE SYS ASSY SED27101375-322	TPS-TBD	REMOVE/INSTALL	4	M
40	COM	V74AD0.130 MSBLS RF #1, 2 & 3 MC409-0017-0007	OMI-TBD SEPAR-TBD	PERFORM 15 MINUTE TEST	4	O

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