

**STS-113**  
**FLIGHT READINESS REVIEW**

**October 31, 2002**

**Ground Operations**

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<b>AGENDA</b>	

- Shuttle Processing
  - Integrated Operations C. Connolly
  - Shuttle Engineering C. Connolly  
J. Cipolletti
  - Launch and Landing M. Leinbach
  - Summary M. Wetmore  
A. Allen  
C. Fontana

# PROCESSING DIFFERENCES

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

## Processing Differences - VAB / Pad

- Planned
  - OSVS IVT
  
- Unplanned
  - PIC system continuity and isolation test
  - MPS/SSME potential contamination
  - FRCS tile R&R
  - T-0 connector R&R/inspections

## Non-Standard Open Work

- None



<b>SHUTTLE ENGINEERING OVERVIEW</b>	<b>Presenter:</b> <b>Chris Connolly</b>
	<b>Organization/Date:</b> <b>Ground Ops/10-31-02</b>

**The following Topics have been reviewed:**

- |  |                       |
|--|-----------------------|
| ● Requirements Status – OMRS               | No Issues             |
| ● TOPS Status                              | No Issues             |
| ● LCC/GLS Status                           | No Issues             |
| ● Software, SCAN, and Configuration Status | No Issues             |
| ● Vehicle/GSE Modification Status          | No Issues             |
| ● In-Flight Anomaly Status                 | No Issues             |
| ● Lost Item Problem Reports                | No Issues (in backup) |
| ● Time/Life Cycle                          | No Issues             |
| ● Critical Process Changes                 | No Issues             |
| ● Unexplained Anomalies                    | No Issues             |
| ● Safety, Quality, and Mission Assurance   | No Issues             |
| ● Engineering Topic                        | To Be Presented       |
| ● Nonstandard Work Summary                 | No Issues (in backup) |

<b>ENGINEERING TOPIC</b> <b>DFRC HYDROCARBON</b> <b>CLEANING EFFORT</b>	<b>Presenter:</b> <b>Chris Connolly</b>
	<b>Organization/Date:</b> <b>Ground Ops/10-31-02</b>

- Observation
  - Hydrocarbons detected in Dryden Flight Research Center (DFRC) landing support equipment
- Actions In Work
  - Remaining DFRC turnaround equipment to be cleaned/validated
    - GN2/GHe distribution panel (1276) – ECD 11/09/02
    - OMS GN2 trickle Purge panel (0570) – ECD 11/09/02
    - Fuel Cell/PRSD purge (1225) – ECD 11/09/02
    - SSME heated purge (1247) – ECD 11/07/02
- Actions Planned
  - Install oil capture filters at facility to DFRC equipment interfaces
- Corrective Action
  - Air Force and USA/Boeing M&P team evaluating cleanliness process of the DFRC shuttle support equipment
- Conclusion
  - DFRC Shuttle landing equipment will support STS-113 landing Actions In Work

# DRYDEN FACILITY GAS DISTRIBUTION SYSTEM CONTAMINATION

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

- Acceptable for STS-113 Flight
  - Overall vehicle assessment shows low likelihood of hydraulic oil contamination present
  - MPS / SSME
    - Vehicle samples showed no trace of hydraulic contamination
      - Total NVR levels detected below specification
    - Testing shows no concerns for autoignition or impact
  - OMS
    - Low risk of contamination due to low flow rate purges
    - Oil not reactive with N<sub>2</sub>O<sub>4</sub> or MMH
    - Engine usage will clear any minor residual contamination
  - FC/PRSD
    - Vehicle samples showed NVR levels within specification
    - Testing shows no concerns for autoignition or impact
    - Water samples are within specification for hydrocarbons

<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE</b>	<b>Presenter: John Cipolletti</b>
	<b>Organization/Date: Ground Ops/10-31-02</b>

- Observation
  - During STS-112 the Ground Launch Sequencer (GLS) issued “Cut Off” at T+ 3 Seconds
    - Post launch review indicated that the Pyrotechnic System A Hold Down Post (HDP) and ET Vent Arm System (ETVAS) Pyrotechnic Initiator Controllers (PICs) did not discharge
- Concern
  - Potential for a similar loss of one level of system redundancy for HDP and ETVAS pyrotechnics for STS-113
- Discussion
  - Ground Operations activated a formal investigation team to analyze the STS-112 anomaly
  - Technical support has been provided to this team by Program Integration, SRB Element, Orbiter Element, and Ground Operations Engineering
  - Extensive testing to date has failed to recreate the anomaly or discover a definitive root cause



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipelletti</b>
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- Discussion (Cont'd)
  - Pyro Systems “A” and “B” are fully independent from, and redundant to, each other
  - ETVAS T-0 Lock (Lanyard) pyro systems are Armed by ground commands initiated by the GLS in parallel with the H<sub>2</sub> Burn system
  - Time critical pyro events later in the count are commanded by the PASS Redundant Set (RS) GPCs via the Master Events Controllers (MECs)
  - A MEC is dedicated to each of the pyro systems
    - MEC 1 commands System A (MEC s/n 10)
    - MEC 2 commands System B (AMEC s/n 2)



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
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- Discussion (Cont'd)
  - The HDP PICs are Armed by the MECs at T-18 sec in parallel with SRM Igniter, ETVAS Ground Umbilical Carrier Plate (GUCP), and Tail Service Mast (TSM)
    - GLS monitoring of capacitor voltages begins at T-16
  - The HDP, ETVAS systems and SRM Igniter receive Fire commands at T-0
    - Fire 1 and Fire 2 commands are sent as a nearly simultaneous event
  - TSM Fire commands occur at T+40 msec



**ENGINEERING TOPIC:  
STS-112 HOLD DOWN POST SYSTEM  
A PYRO FAILURE (CONT'D)****Presenter:****John Cipolletti****Organization/Date:****Ground Ops/10-31-02**

- Discussion (Cont'd)
  - Each redundant NASA Standard Initiator (NSI) is initiated by a dedicated PIC
    - 16 separate PICs for “A” and “B” HDP devices and four separate PICs for “A” and “B” ETVAS devices
  - The PIC design requires 3 separate commands to detonate its NSI
    - ARM—Activates the PIC’s power supply and charges the capacitor bank
    - Fire1—Activates a switching transistor controlling the PIC output return and enables the Fire2
    - Fire2—Activates a switching transistor controlling the PIC output which discharges through the NSI



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- Discussion (Cont'd)
  - ETVAS pyro Fire commands are branched from the HDP Fire commands
    - Data indicates the Fire command did not reach the branch point for the ETVAS system within PIC Rack 6743 so no signal was passed to the ETVAS Card Files
    - Therefore the failure of the two ETVAS "A" PICs to discharge has a common root cause to the HDP "A" PIC failure and will not be treated separately



**ENGINEERING TOPIC:  
STS-112 HOLD DOWN POST SYSTEM  
A PYRO FAILURE (CONT'D)**

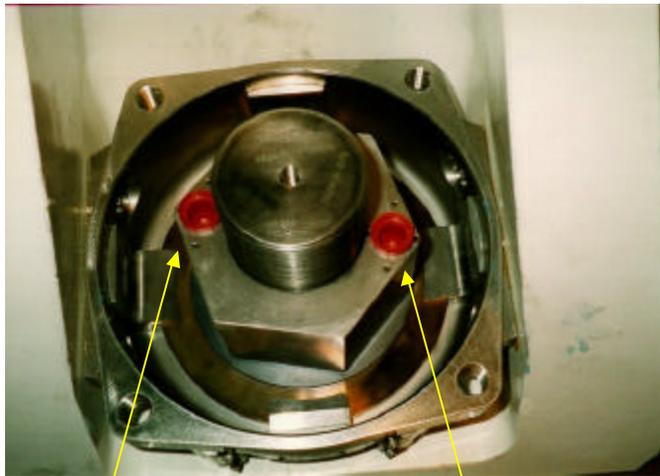
**Presenter:**

**John Cipolletti**

**Organization/Date:**

**Ground Ops/10-31-02**

**HDP Stud with Frangible Nut**



**NSI 1 Provision**

**NSI 2 Provision**

**ET Vent Arm System**



**Lanyard Attach Point**

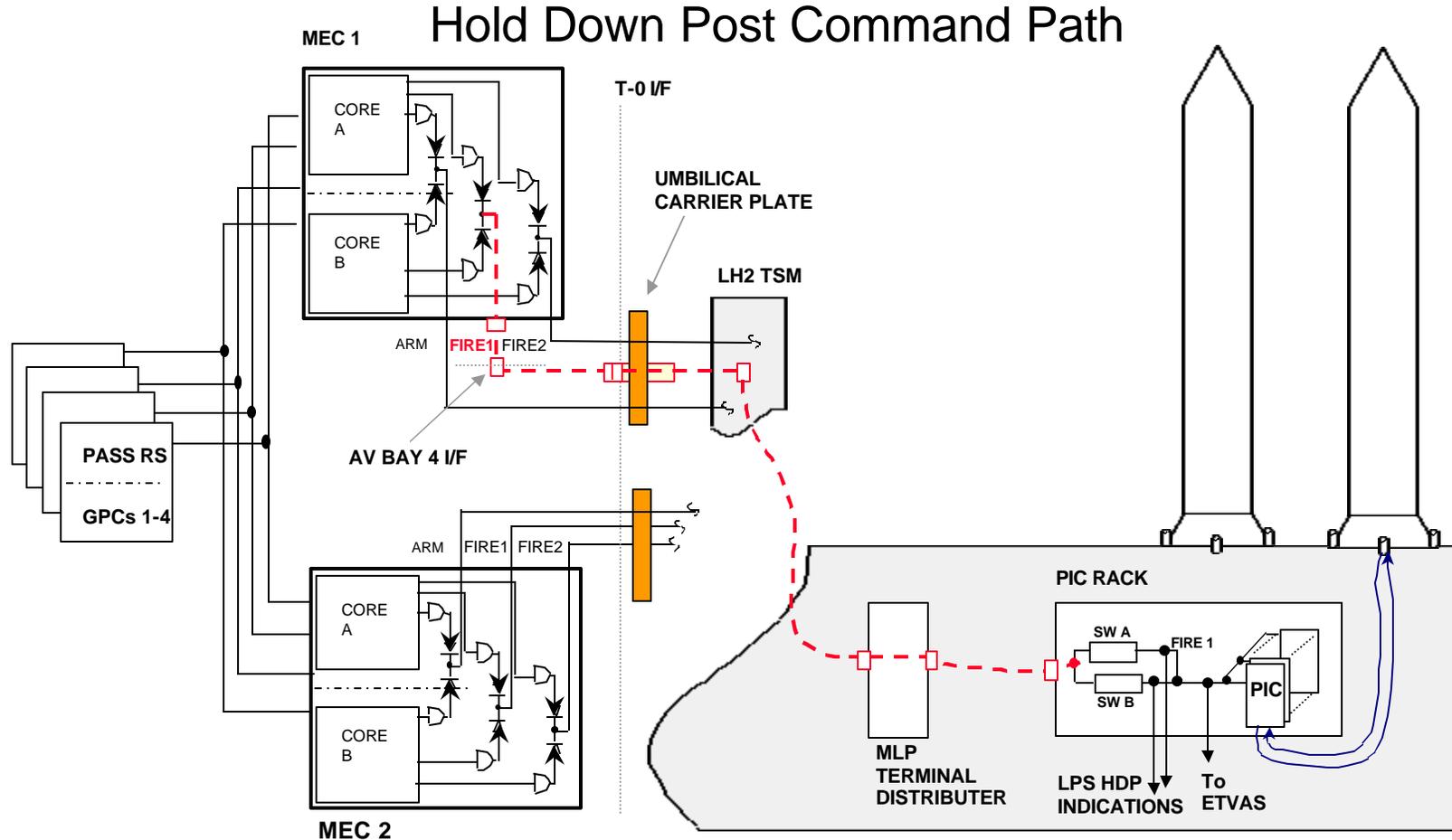
<p><b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b></p>	<p><b>Presenter:</b> <b>John Cipelletti</b></p>
	<p><b>Organization/Date:</b> <b>Ground Ops/10-31-02</b></p>

- Possible Causes (From Fault Tree)
  - MEC 1 did not receive the SRB Ignition Command from RSLs
  - MEC 1 failed to send HDP Fire commands to the ground pyro system
  - The Fire 1 command was not transmitted properly from MEC 1 to the PIC Rack Control Panel Assembly (CPA)
  - The ten associated PIC's failed to respond to the MEC 1 command
  - Ten individual PIC outputs to the HDP and ETVAS pyrotechnics were not transmitted properly
  - Ten individual pyrotechnics failed



# ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)

Presenter:  
**John Cipelletti**  
Organization/Date:  
Ground Ops/10-31-02



**ENGINEERING TOPIC:  
STS-112 HOLD DOWN POST SYSTEM  
A PYRO FAILURE (CONT'D)****Presenter:****John Cipolletti****Organization/Date:****Ground Ops/10-31-02**

- Possible Causes (Cont'd)
  - The command path to MEC 1 from the RS GPCs can be eliminated as a cause of the anomaly
    - RSLs processing was reviewed and no anomalies noted
      - Commands issued to MEC1 and MEC2
      - All MEC2 responses were normal
    - GLS processing was reviewed and no anomalies noted
      - Main Line Processing loop waiting for 2 of 2 HDP T-0 Bus On indications was per requirement
      - GLS cutoff indication was per requirement
  - MEC 1 processed the SRB Ignition command as evidenced by
    - System "A" Solid Rocket Motor (SRM) Igniter activation verified by inspection of expended ordnance
    - System "A" Tail Service Mast (TSM) T-0 separation activation verified by expended ordnance



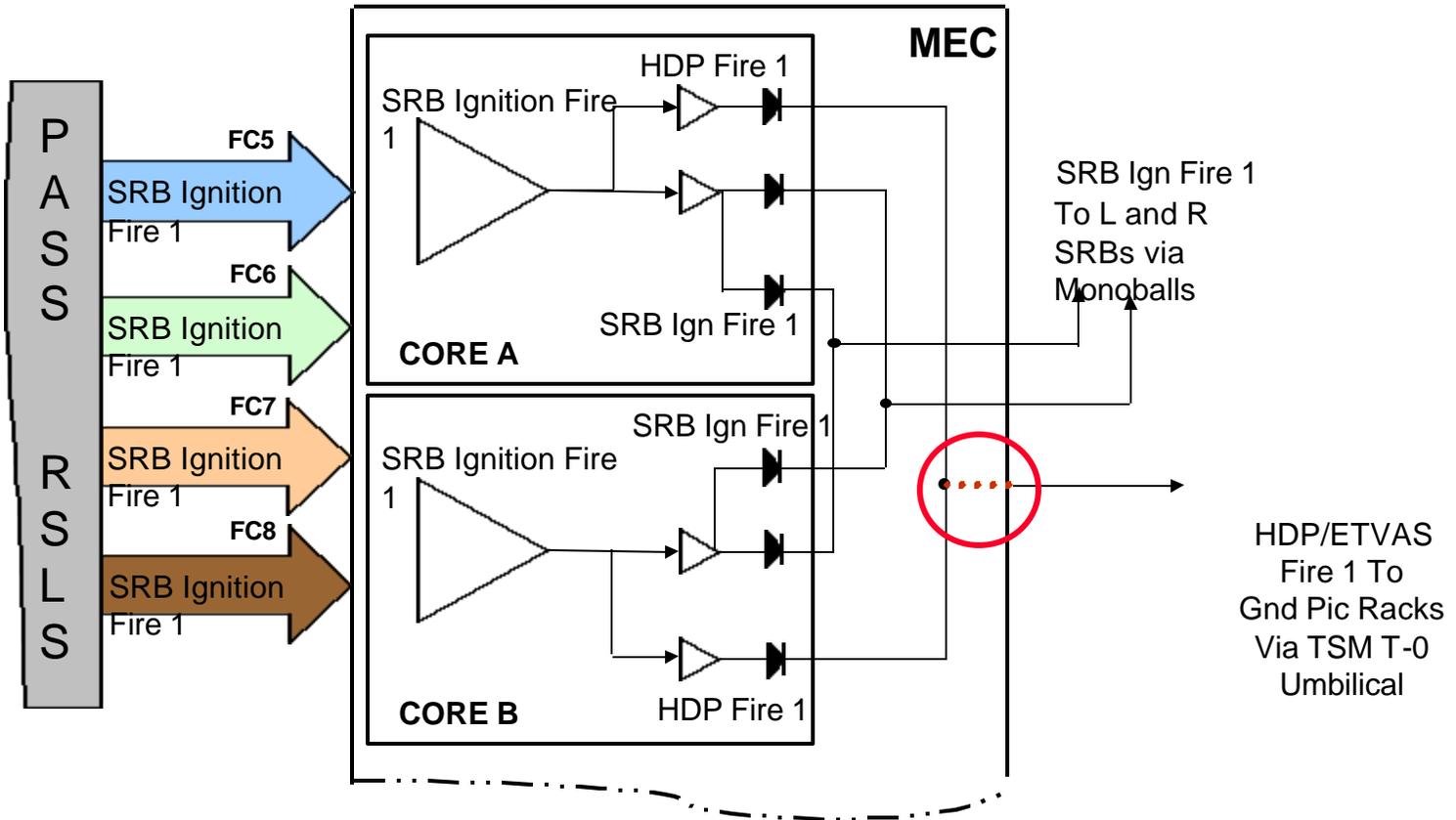
<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
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- Possible Causes (Cont'd)
  - The MEC can be eliminated as a possible cause of the anomaly
    - A MEC 1 Core processing failure can be eliminated
      - MEC 1 correctly processed the SRB Ignition command
      - Incorrect HDP processing requires two simultaneous, intermittent like failures
    - MEC 1 driver output failure can be eliminated
      - Testing indicates diodes are intact
      - Two simultaneous, intermittent failures would be required
    - One common wire path for this command exists within the MEC has been cleared
      - Static testing shows the common path to be intact and MEC output of ARM, Fire 1, and Fire 2 commands has been verified
      - Dynamic stability of internal wiring has been verified. MEC s/n 10 was removed from the MEC 1 position and passed ATP with vibration



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**MEC SRB Ignition Fire 1 Command Set**



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- Possible Causes (Cont'd)
  - The Fire 1 command was not transmitted properly from MEC 1 to PIC Rack 6743 in the MLP
    - There is a single copper path for the Fire 1 command from MEC 1 to the PIC Rack that crosses the T-0 interface
    - There are three main sub-level contributors to this fault path
      - Orbiter wiring and connectors
      - T-0 Interface
      - Ground MLP wiring and connectors

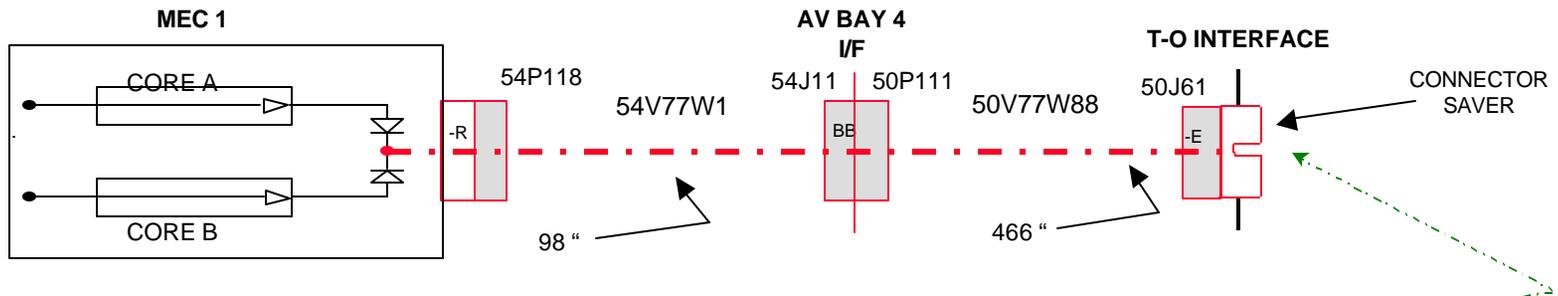


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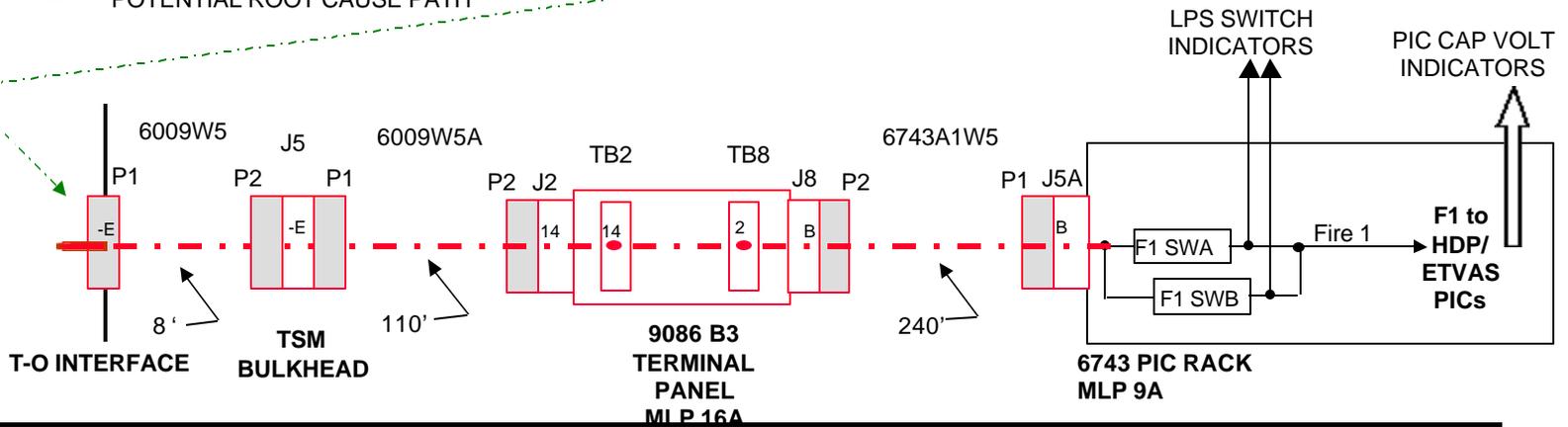
## SYSTEM A HDP / ETVAS Fire 1 Command Path

(Return not shown)



- - - POTENTIAL ROOT CAUSE PATH

M  
L  
P



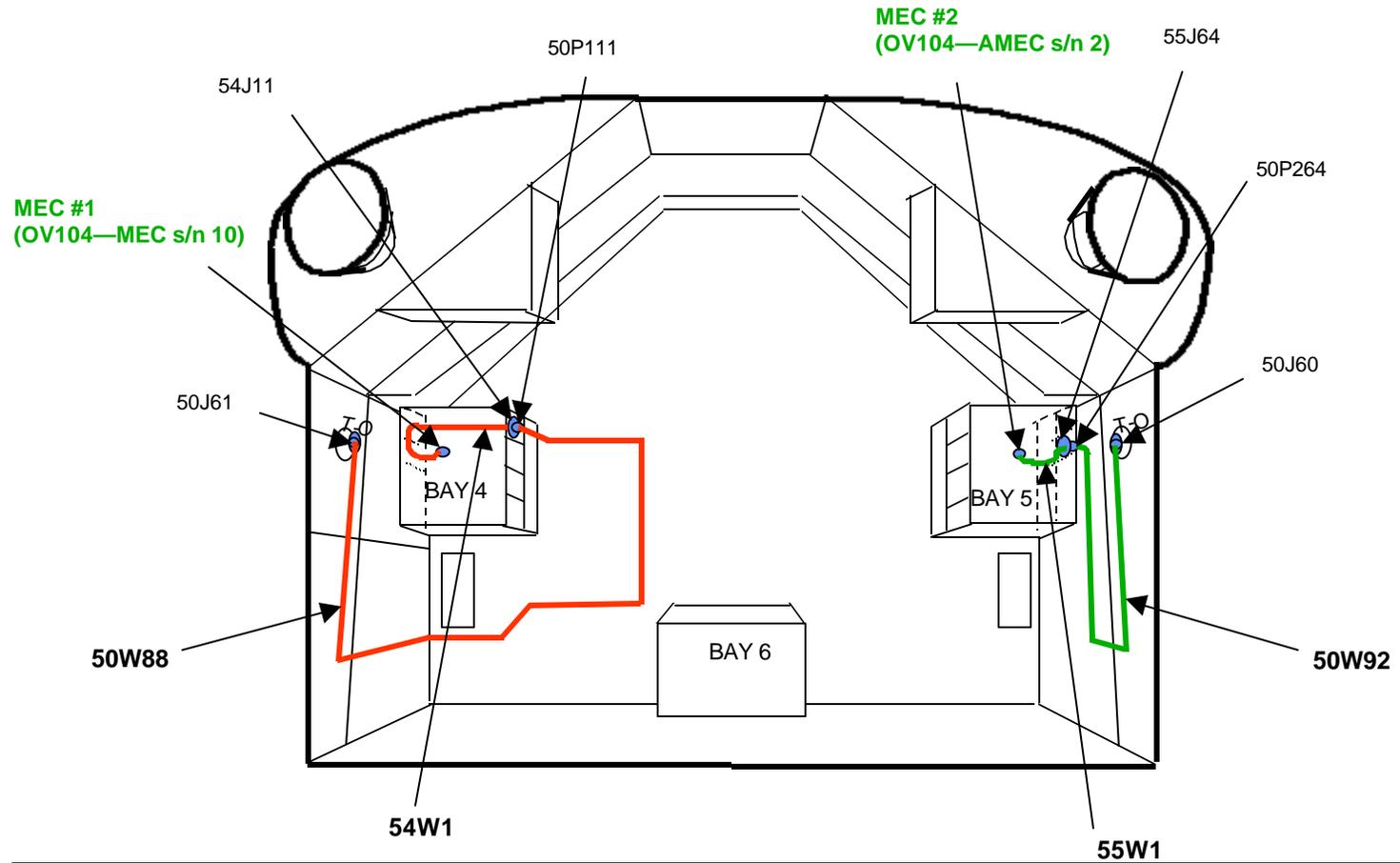
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- Possible Causes (Cont'd)
  - The Fire 1 command was not transmitted properly from MEC 1 to PIC Rack 6743 in the MLP – *Orbiter Wiring/Connectors*
  - Testing has not detected a problem in the Orbiter cabling and connectors under static conditions and while flexing cabling at connectors
    - ARM, Fire 1, and Fire 2 signals have been sent from MEC 1 and verified at the T-0 connector saver (50J61)
    - Isolation tests, continuity tests, and Dielectric Withstanding Voltage (DWV) tests have been conducted on the wire run between MEC 1 and the T-0 connector
      - Wire run 54W1 and 50W88 with associated connectors
      - DWV run at 1500 VDC, 0.5 mAmp
  - Replacement of the entire wire run is planned along with Failure Analysis of the removed components



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter:</b> <b>John Cippolletti</b>
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### MEC 1 and 2 to T-0 Wire Runs



**ENGINEERING TOPIC:  
STS-112 HOLD DOWN POST SYSTEM  
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- Possible Causes (Cont'd)
  - The Fire 1 command was not transmitted properly from MEC 1 to PIC Rack 6743 in the MLP – *T-0 Interface*
  - The Carrier Plate was assembled per standard process and verified within specification and is not considered to be a cause of the anomaly
    - Carrier plate foot assemblies are adjusted to pre-set values for each Orbiter
    - All collet and bumper values were within specification
      - LH and RH Collet 0.004 (0 – 0.010 allowed)
      - LH Bumper 0.020, RH 0.009 (One bumper 0.002 to 0.010, second 0.002 to 0.100)
    - TSM operation times were within specification
      - 1.199 secs (1.1 to 1.3 seconds)



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- Possible Causes (Cont'd)
  - The Fire 1 command was not transmitted properly from MEC 1 to PIC Rack 6743 in the MLP – *T-0 Interface*
  - The electrical connector remains as a possible cause
    - Visual inspection using 10x magnification detected contamination and missing gold plating on the 6009W5 P1 connector pins
    - Orbiter connector saver showed no discrepancies under 10x inspection
    - Pressure Spring constant was determined to be 30.5 lb/in, drawing requirement for new spring is 34.9 lb/in
    - Pin/socket engagement was examined under x-ray and determined to be within specification at 3.6 mm
    - Further analysis of all components is planned



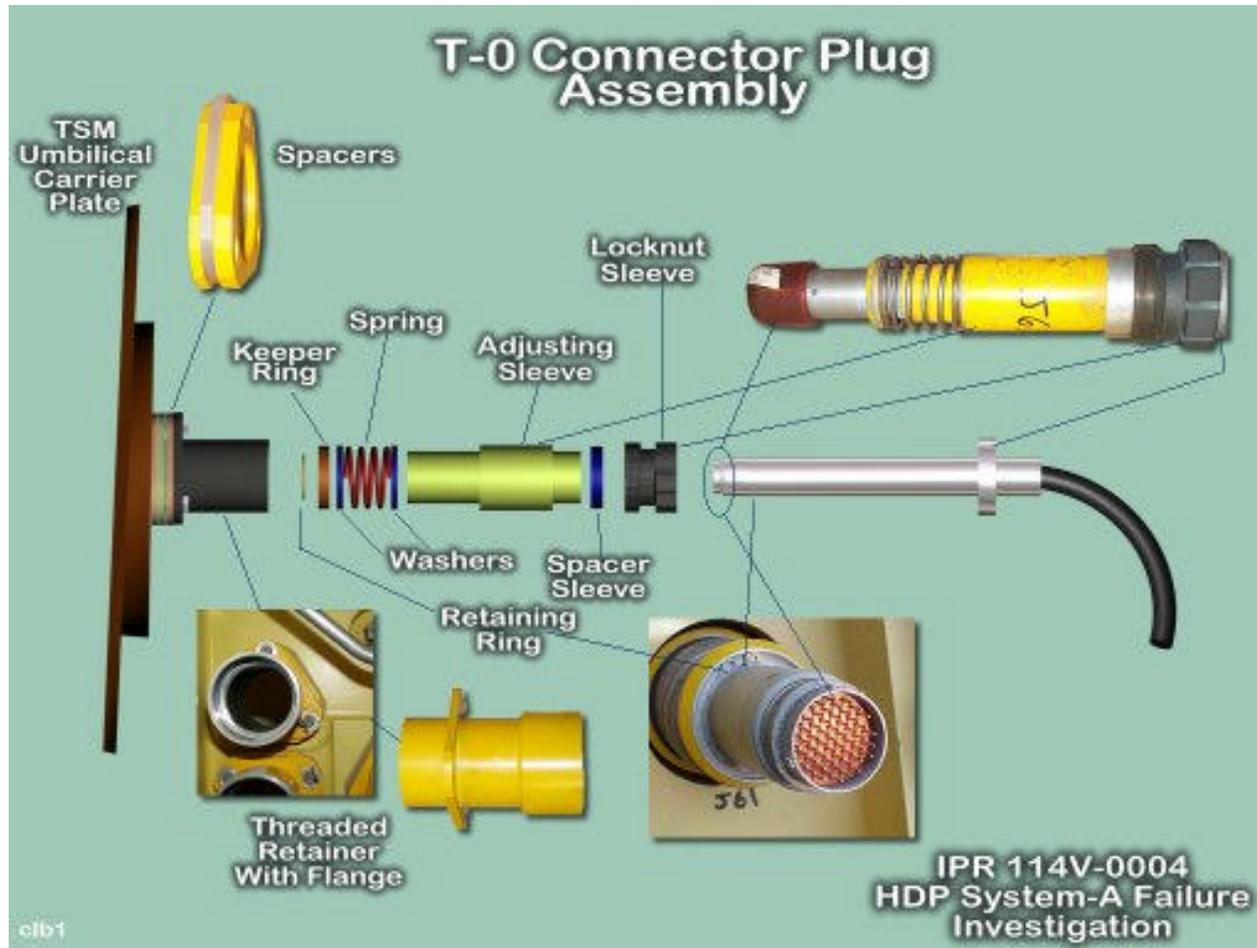
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**ENGINEERING TOPIC:  
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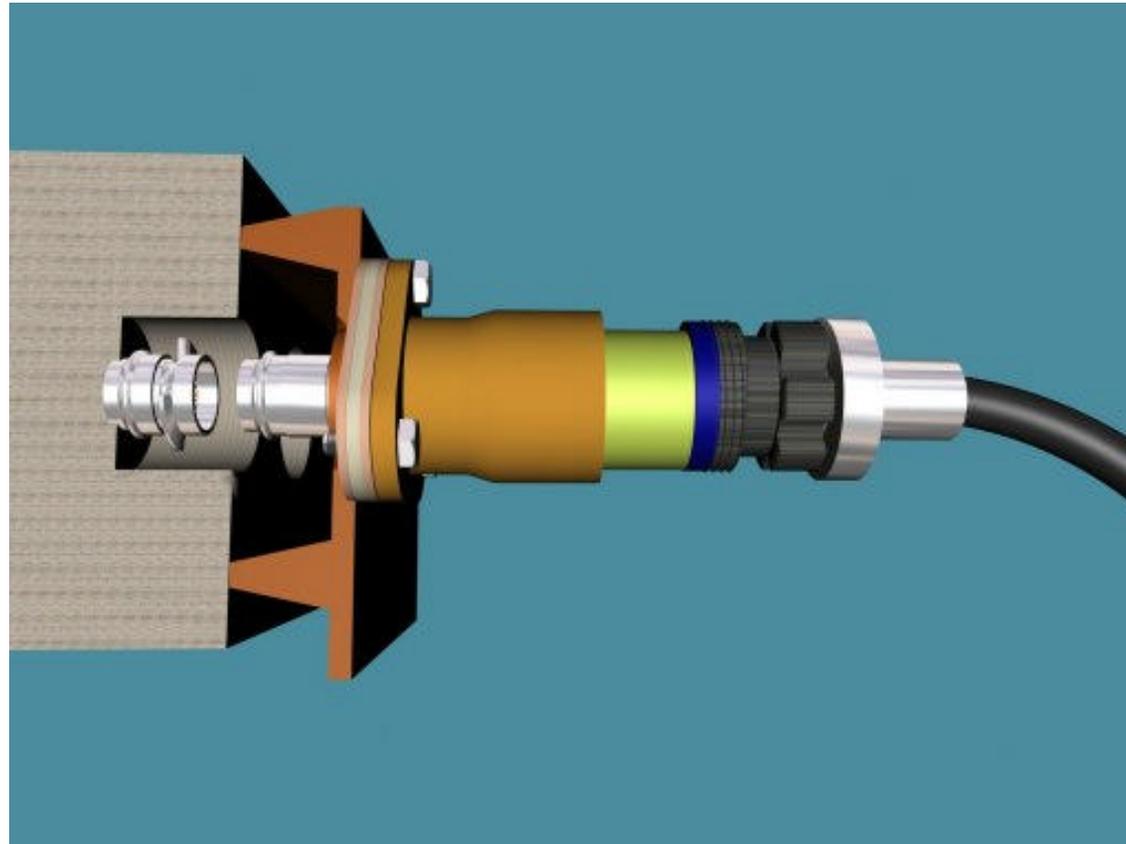
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**Cut-Away Illustration of T-0 Connector Mate**



**ENGINEERING TOPIC:  
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**OV-104 50J61 Connector Saver**

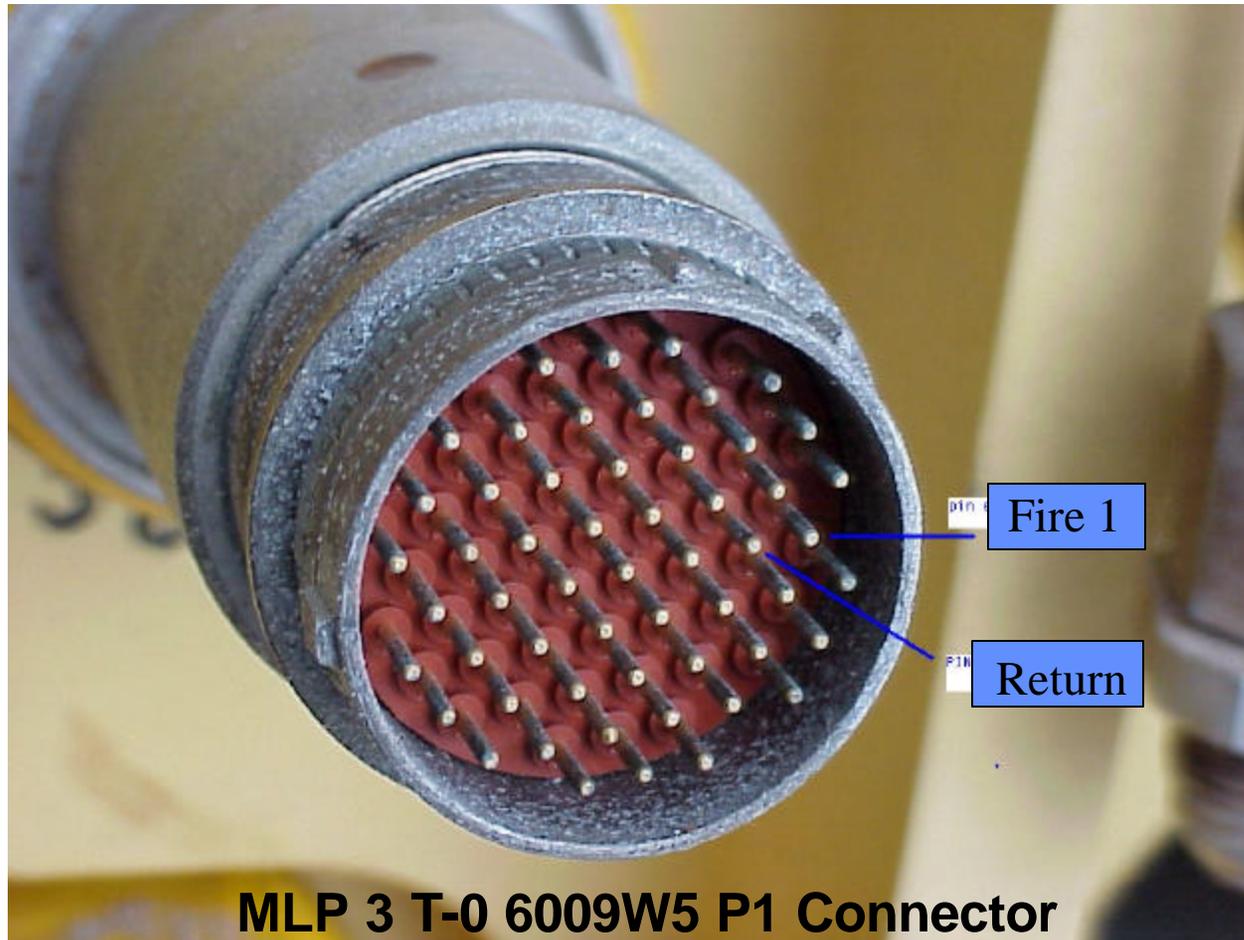
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<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
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- Possible Causes (Cont'd)
  - The Fire 1 command was not transmitted properly from MEC 1 to PIC Rack 6743 in the MLP – *MLP Wiring/Connectors*
  - No problem has been detected with the MLP cabling and connectors under static conditions and while flexing cabling at connectors
    - Using a shorting plug and HIM commands ARM, Fire 1, and Fire 2 signals were sent to the PIC Rack through the T-0 connector (6009W5 P1)
    - Isolation tests, continuity tests, and Insulation Resistance (IR) tests have been conducted on the wire run between the T-0 connector and the PIC Rack
      - Wire run 6009W5, 6009W5A and 6743A1W5
      - IR test performed at 500 VDC, 100 Mohm Criteria



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- Possible Causes (Cont'd)
  - The Fire 1 command was not transmitted properly from MEC 1 to PIC Rack 6743 in the MLP – *MLP Wiring/Connectors*
  - Non-Destructive Failure Analysis is completed on MLP wire runs
    - Cable 6009W5 was removed and real-time radiography performed on the connectors and wire length. No anomalies noted
    - Cable 6009W5A was removed and x-ray analysis performed on suspect damage areas and connectors. No anomalies noted
    - Cable 6009W5 and 6009W5A were mated and real-time radiography and x-ray analysis performed on the mating interface
      - Normal pin insertion of 3.25 mm was measured



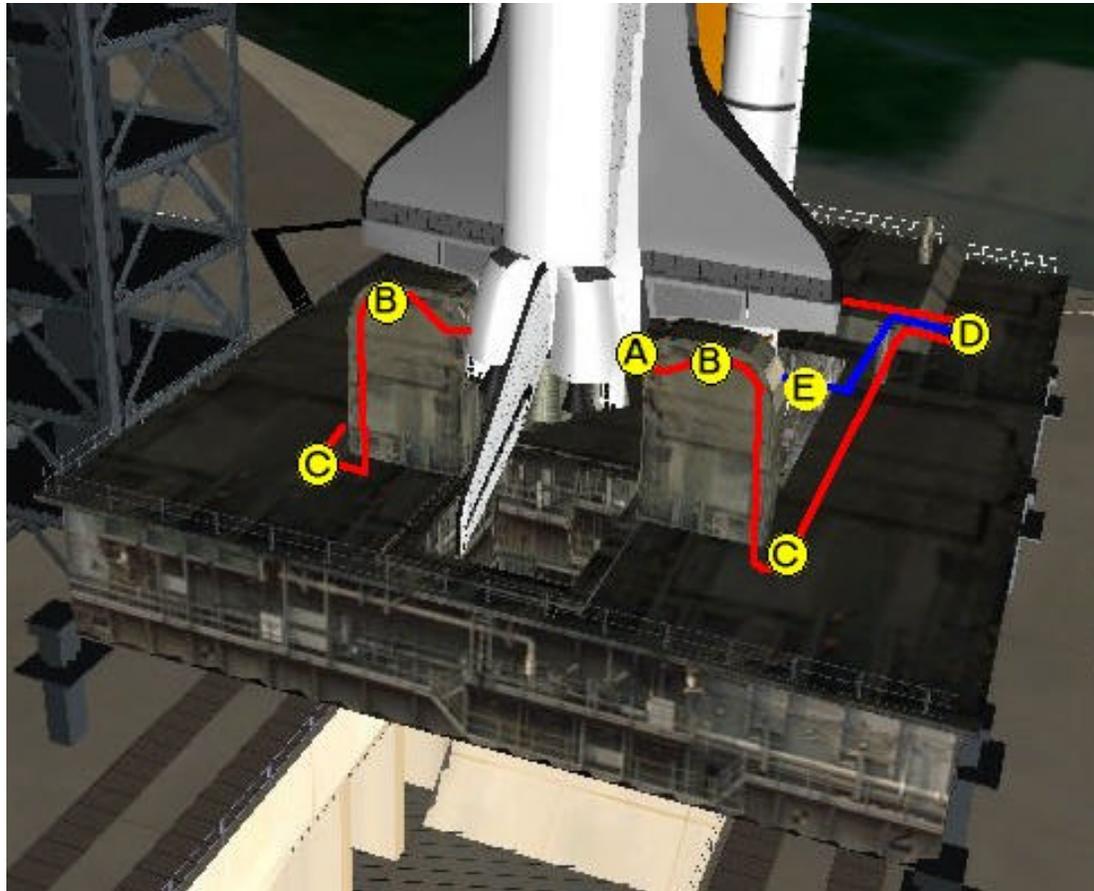
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**MLP T-0 To Hold Down Post Wire Runs**



**ENGINEERING TOPIC:  
STS-112 HOLD DOWN POST SYSTEM  
A PYRO FAILURE (CONT'D)**

**Presenter:**

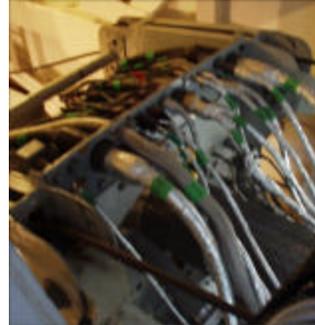
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**A) T-0 Umbilical**



**B) Bulkhead Plate (BHP)**



**C) Terminal Distributor (TD)**



**D) PIC Rack**



**E) Hold Down Post**

**MLP T-0 To HDP Wire Runs**

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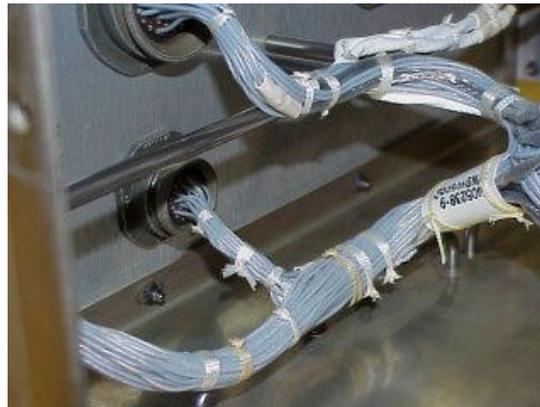
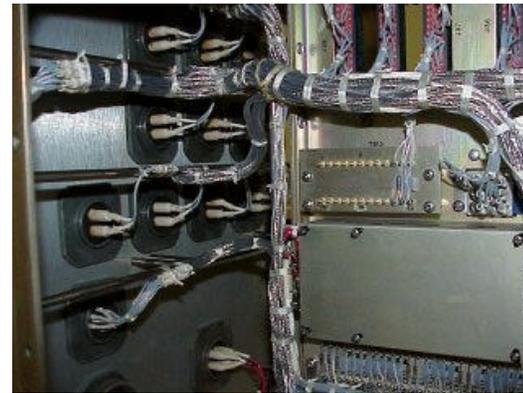
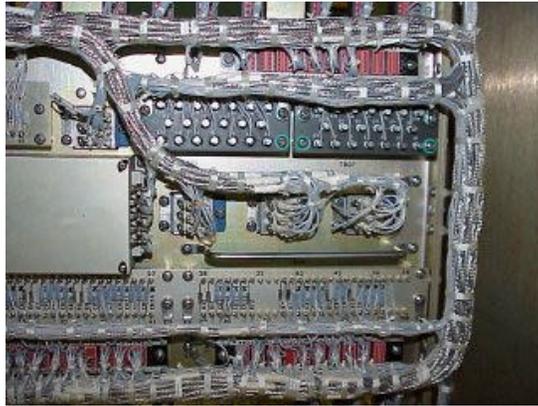
- Possible Causes (Cont'd)
  - The Fire 1 command was not transmitted properly from MEC 1 to PIC Rack 6743 in the MLP – *MLP Wiring/Connectors*
  - Failure of the PIC Rack CPA can be eliminated as a cause of this anomaly
    - PIC(s) responded within specification to ARM, Fire 1, and Fire 2 commands during testing
    - PIC Rack switching transistors responded to voltage/current levels well below MEC output capability (even with one driver failed)
      - Transition occurred at 14.4 VDC, 3 mA
      - Normal MEC output is 28 VDC, 20 mA
    - LRU level testing of CPA has been performed
      - Visual inspection of all components
      - Continuity check of all circuits, static and while flexing
      - IR and DWV of internal wiring
      - Inspected and performed retention test of junction module (Deutsch Block)



**ENGINEERING TOPIC:  
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**Internal Photos of Spare CPA**



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
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- Possible Causes (Cont'd)
  - Ten individual PIC(s) failing to respond to the MEC 1 command can be eliminated as a cause of the anomaly
    - PIC(s) responded within specification to ARM, Fire 1, and Fire 2 commands during troubleshooting
    - Would require ten simultaneous, intermittent PIC card failures
    - No Fire 1 command was seen at the PIC Rack upstream of the PIC Cards during anomaly
    - ARM commands were handled by the PIC(s) and capacitor charge remained steady through T-0



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- Possible Causes (Cont'd)
  - Failure of the firing lines from the individual PIC card output to the HDP and ETVAS pyrotechnics can be eliminated as a cause of the anomaly
    - Requires ten simultaneous, intermittent failures
    - No command was seen upstream of the PIC Cards at the PIC Rack
  - Individual Pyrotechnic failure can be eliminated as a contributor
    - Requires ten simultaneous failures
    - No command was seen upstream of the PIC Cards at the PIC Rack



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipelletti</b>
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- Prior Occurrences
  - There are no prior occurrences of this anomaly, however there have been recent Unexplained Anomalies citing corrosion on the T-0 interface pins as the most probable cause
    - Problems occurred on low voltage (5 V) data signals only
    - Signal was present but distorted enough for data drop out to occur
      - Open detected during testing on one anomaly
    - Failure Analysis has been unable to detect a root cause
    - Data cables on the MLPs were replaced and other T-0 connectors cleaned
    - Probable cause postulated for these Unexplained Anomalies was not considered to be capable of effecting higher voltage signals or discretes



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- Prior Occurrences (Cont'd)
  - There are no prior occurrences of this anomaly, however there have been recent Unexplained Anomalies citing corrosion on the T-0 interface pins as the most probable cause (Cont'd)
    - Summary of recent data Unexplained Anomalies attributed to the T-0 interface
      - Loss of PCM1 during STS-105 standard power up on MLP3
        - Signal returned after T-0 demate/mate
      - Loss of LDB1 at SSME start during STS-105 on MLP3
      - Loss of LDB1 three times during standard power up and detank operations during STS-110 on MLP1
      - Loss of EIU3 data two times during STS-111 on MLP1
        - Signal returned during tanking



**ENGINEERING TOPIC:  
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A PYRO FAILURE (CONT'D)****Presenter:****John Cipelletti****Organization/Date:****Ground Ops/10-31-02**

- Most Probable Cause
  - The Fire 1 command was lost due to a single wire path failure at the T-0 Interface
    - Configuration and environment of this interface at the time of the anomaly cannot be fully reproduced and tested
      - Impact of launch on components
      - Components cleaned at T+5 hours to prevent degradation
      - Environmental temperature, vibration, acoustic, and relative motion can not be replicated
        - Vibration test is being conducted to check one environmental component
    - Independent testing of the MLP and Orbiter components of this wire path have failed to detect an anomaly
    - Inspection has detected wear and contamination at this interface
    - T-0 Interface connector mates are performed “blind” and there is no secondary mechanical or visual verification of the mate
      - Verification is by static functional testing
    - Similar Unexplained Anomalies are associated with this interface



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
	<b>Organization/Date: Ground Ops/10-31-02</b>

- Flight Rationale
- Ground and Flight Software have been eliminated as a possible cause of the anomaly
  - OV-105 has an AMEC (s/n 11) and EMEC (s/n 2) pair which has flown four times
  - Database reviews show no connector activity or discrepancies associated with this Orbiter wire path on OV-105
  - At the T-0 Interface
    - All Orbiter T-0 Connector Savers have been replaced
      - Pyro connectors prescreened with pin retention test
    - All T-0 Ground Cables have been replaced
    - The Pyro Ground Cables from the BHP to the PIC rack have been checked for insulation resistance
    - Connector saver mate have been verified using a Videoscope
    - Connector mate have been witnessed using a Videoscope
    - Retention springs have been replaced



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
	<b>Organization/Date: Ground Ops/10-31-02</b>

- Flight Rationale (Cont'd)
  - Database reviews shows no discrepancies or modifications associated with the MLP command wire path
  - No equipment in this system has been transferred from MLP3 to MLP2
  - Standard testing was performed during MLP validation, Shuttle Integrated Testing, and Shuttle/Pad Interface testing without anomaly
    - ARM, Fire 1, and Fire 2 command path verification
    - PIC Capacitor discharge verification
  - Testing during Final Ordnance Installation is planned



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
	<b>Organization/Date: Ground Ops/10-31-02</b>

- Risk Assessment
  - Based on the current data from the STS-112 investigation, the action taken to mitigate the most probable cause means that there is no increased risk for STS-113 launch as a result of the STS-112 HDP/ETVAS Pyro Failure



<b>ENGINEERING TOPIC: STS-112 HOLD DOWN POST SYSTEM A PYRO FAILURE (CONT'D)</b>	<b>Presenter: John Cipolletti</b>
	<b>Organization/Date: Ground Ops/10-31-02</b>

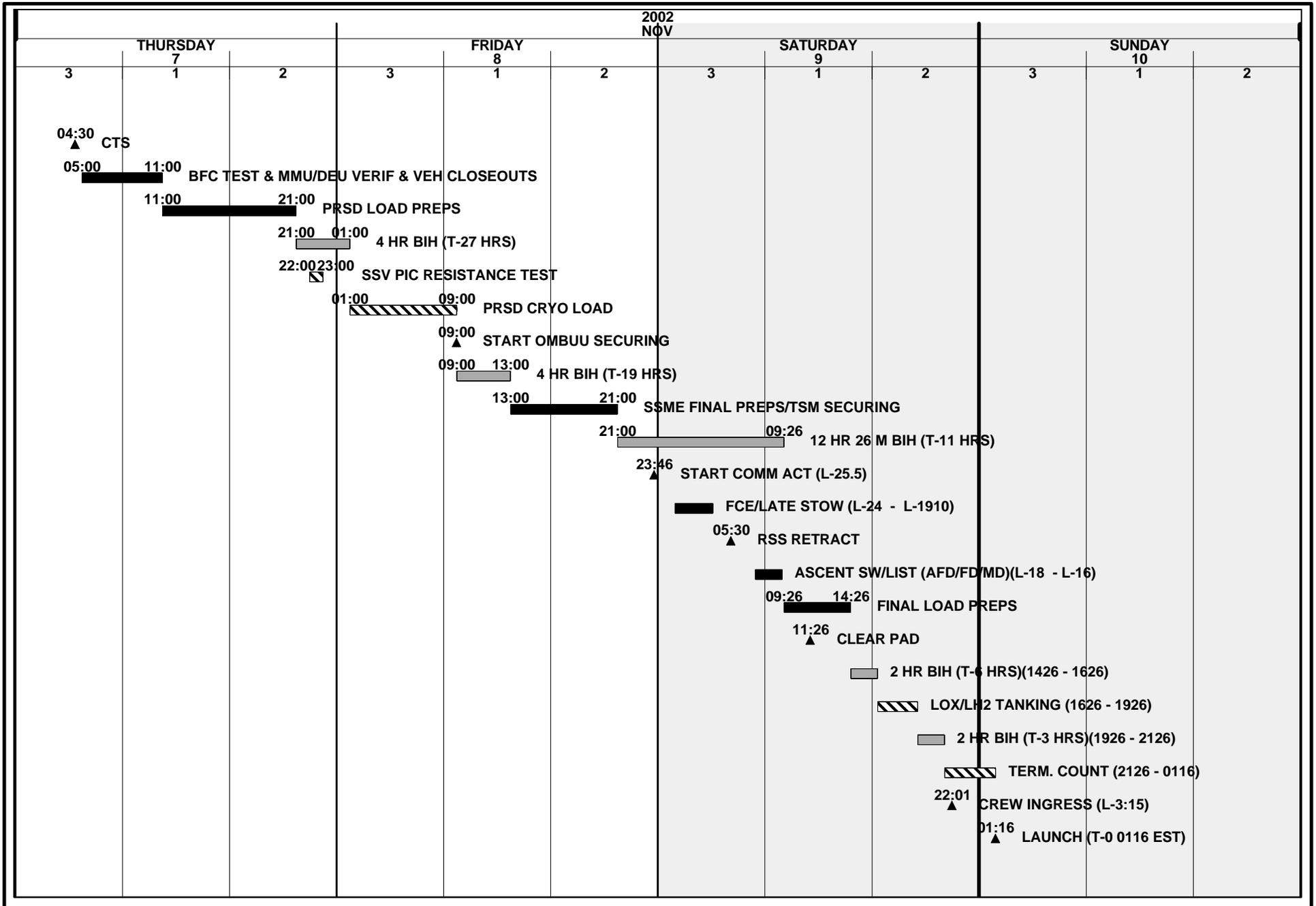
- FRR Exceptions 10-30-02
    - Two open Fault Tree actions
    - Removal and analysis of MLP- 3 6743A1W5 (240') cable run
      - Inspection, x-ray, and continuity
    - Removal and analysis of OV-104 54W1 and 50W88 (MEC to T-0) wire run
      - Inspection and x-ray
  - Action
    - Verified MLP-2 long run Pyro cables runs between Terminal Distributors and PIC Rack
      - Both the "A" and "B" system Pyro cables had IR tests performed
-

# STS-113 / OV-105

## Launch Countdown Summary

OPR: S. Altemus (1-9302)

10OCT02 12:29



NOTE: Actual Scrub turnaround timelines will be determined realtime based on specific conditions encountered.

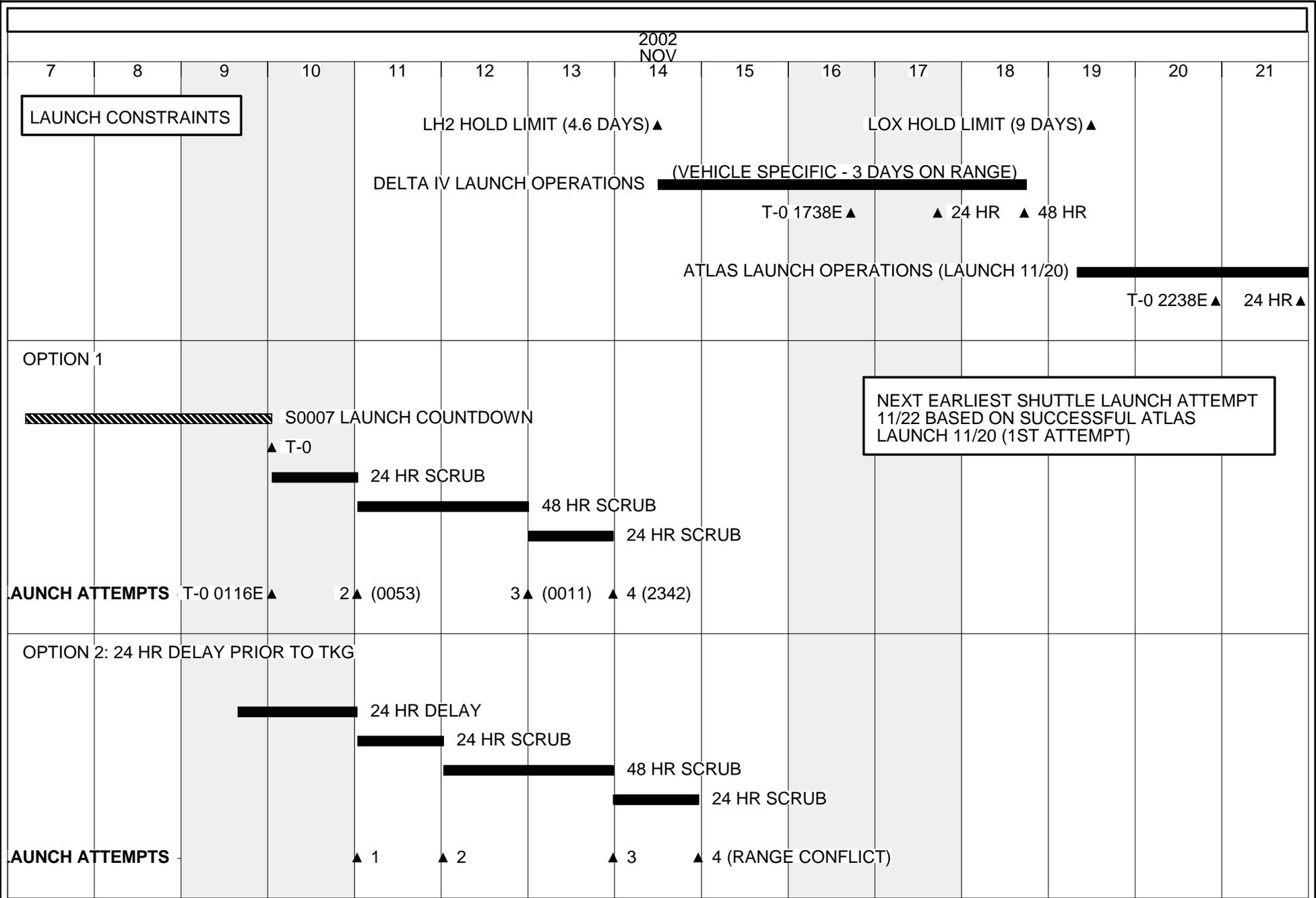
# STS-113

## LCD TURNAROUND OPTIONS - NOV 10TH

OPR: S. ALTEMUS 1-9302

28OCT02

15:07



# LANDING OPERATIONS STATUS

**Presenter:**

**Mike Leinbach**

**Organization/Date:**

**Launch & Landing/10-31-02**

- **Launch Support**
  - ❖ **RTLS:** KSC
  - ❖ **TAL:**
    - Zaragoza (Prime)                      Deploy L-6, Nov 4, 2002
    - Moron (Alt)                                Deploy L-6, Nov 4, 2002
  - ❖ **AOA:**
    - KSC (Prime)
    - WSSH (Alt)                                Deploy at L-3 days, Nov 7, 2002
  
- **Mission Support**
  - ❖ KSC (Prime EOM)
  - ❖ DFRC/EDW                                Deploy at L-2 days, Nov 8, 2002
  - ❖ WSSH
  
- **Site Status**
  - DFRF – Efforts continue to decontaminate, clean, and reassemble GSE panels for support of Dryden turnaround operations. Panels and associated parts should be ready and validated to support STS-113



**SPECIAL TOPIC:  
SSP CONTINGENCY SIM****Presenter:****Mike Leinbach****Organization/Date:****Launch & Landing/10-31-02**

- Contingency Simulation – Nov 1, 2002
- Formal Pre-Test Briefing – LCC Room 1R29 at 8:00 am.
- Call-to-Stations – LCC Firing Rooms 3 & 2 at 9:00 am.
- Pre-Launch Phase - begin at the T-9 minute hold (L-19 min) at 09:15 am and proceed through launch.
- Ascent/Contingency Phase – Ascent through contingency should conclude about 11:30 am.
- Mishap Response Telecon (MRT) - LCC Room 1R29 immediately following the contingency phase. Controlled access will be in effect.
- Simulation Debriefing - LCC Room 1R29 at the conclusion of the MRT and should conclude by 13:00 pm EST.





# Kennedy Space Center Shuttle Processing Team



## STS-113 Readiness Statement

*This is to certify that appropriate CoFR items from NSTS-08117 Appendices H and Q, Flight Preparation Process Plan, have been reviewed and dispositioned. Subject to completion of planned work and resolution of any identified constraints, KSC Shuttle Processing and Supporting Organizations are ready to support Launch Operations.*

S/J. Presnell for

Chuck J. Fontana  
APM, Integrated Logistics,  
USA.

S/Andrew Allen

Andrew A. Allen  
APM, Ground Operations,  
USA.

S/David A. King

David A. King  
Director of Shuttle Processing,  
NASA



**STS-113**  
**FLIGHT READINESS REVIEW**  
**BACKUP**

**October 31, 2002**

**Ground Operations**

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# UNEXPLAINED ANOMALY HGDS TRANSIT TIME EXCEEDED

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

- Observation
  - Lower starboard Payload Bay Hazardous Gas Detection System (HGDS) sample line transit time exceeded 30 seconds (actual time 35 seconds)
    - Occurred during STS-113 S0004 VAB testing
    - Lower port Payload Bay sample transit times nominal
- Concerns
  - Contamination/blockage of HGDS sample line system

# UNEXPLAINED ANOMALY HGDS TRANSIT TIME EXCEEDED (CONT'D)

**Presenter:**

**Chris Connolly**

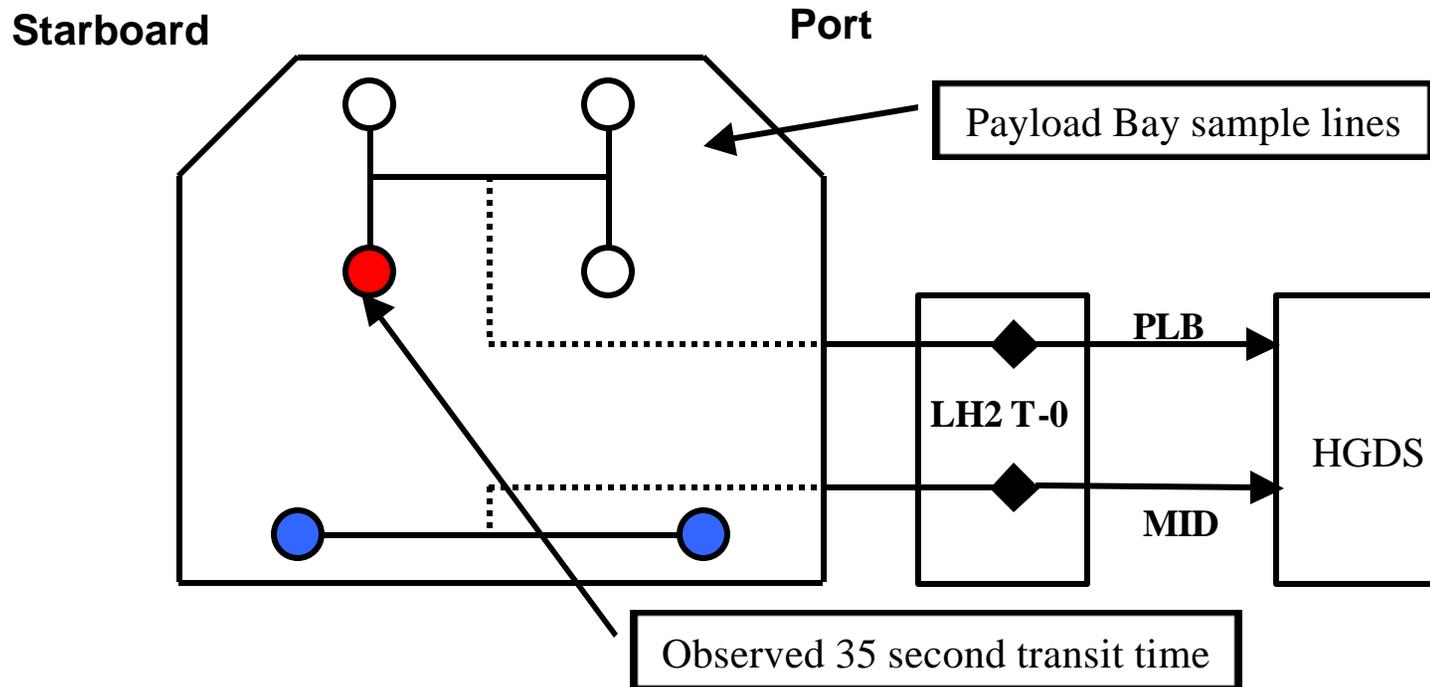
**Organization/Date:**

**Ground Ops/10-31-02**

- Discussion
  - Aft, Payload Bay, and Midbody HGDS sample lines
    - Verified every flow by injecting helium into Aft pickup tubes located at 1307 bulkhead
  - All four Payload Bay sample lines are equal lengths and merge into one line (homogenous mixture)
    - 1 of 4 sample lines supports Payload Bay sampling
- Actions Taken
  - Testing of four Payload Bay sample line was performed at Pad-A
    - Transit time acceptable at 17 seconds
    - Lower starboard sample line blow down indicated no contamination
    - Pressure decay verified integrity of line (no leaks)
    - Performed test with Payload Bay doors closed (original configuration of initial problem)
      - Transit times nominal (actual - 17 seconds)

<b>UNEXPLAINED ANOMALY HGDS TRANSIT TIME EXCEEDED (CONT'D)</b>	<b>Presenter:</b>
	<b>Chris Connolly</b>
	<b>Organization/Date:</b> <b>Ground Ops/10-31-02</b>

Aft 1307 bulkhead as seen from the Payload Bay side



# UNEXPLAINED ANOMALY HGDS TRANSIT TIME EXCEEDED (CONT'D)

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

- Actions Planned
  - HGDS troubleshooting prior to S0007
    - Remove Flow Splitting Panel (FSP) from MLP HGDS
      - Analyze for contaminants
    - Perform blow down of GSE hose from FSP to T-0 interface
      - Capture and sample possible debris
    - Re-perform Payload Bay transit times (lower ports only)
  
- Most Probable Cause
  - Transient contamination
    - Entered Payload Bay sample line and migrated into ground HGDS system

**UNEXPLAINED ANOMALY  
HGDS TRANSIT TIME EXCEEDED  
(CONT'D)****Presenter:****Chris Connolly****Organization/Date:****Ground Ops/10-31-02**

- S0007 Rationale
  - Orbiter HGDS sample lines meet flow rate of 7 to 8 SLPM
    - File III OMRSD require minimum of 6 SLPM
  - Orbiter HGDS sample lines have not been modified
  - All 4 Payload sample ports transit time nominal
    - STS-113 Payload does not contain any hazardous commodities
    - 1 of 4 sample lines will support detection of Payload Bay gases
  
- Risk Assessment
  - No risk to Flight and Crew's safety or mission success

**ENGINEERING TOPIC  
HELIUM BUBBLING DIFFERENTIAL  
TRANSDUCER****Presenter:****Chris Connolly****Organization/Date:****Ground Ops/10-31-02**

- Observation
  - External Tank (ET) LOX Helium bubbling differential pressures below OMRSD limit of 1.0 to 1.9 psid
    - Actual transducer values
      - Primary 0.97 psid, Secondary 0.99 psid
  - Occurred during STS-113 Pad-A testing for ET-116
- Concerns
  - Ability of helium purge flow to provide ET anti-geyser protection
    - LOX feedline geyser could cause catastrophic failure to flight hardware

<b>ENGINEERING TOPIC HELIUM BUBBLING DIFFERENTIAL TRANSDUCER (CONT'D)</b>	<b>Presenter: Chris Connolly</b>
	<b>Organization/Date: Ground Ops/10-31-02</b>

- Discussion
  - ET Helium bubbling purge
    - Provided from Fixed Service Structure (FSS) 215 ft panel to ET-116 via Ground Umbilical Carrier Plate (GUCP) interface
    - Firing Room software
      - Activates purge during LOX transfer line chilldown
      - Purge remains active until terminal replenish
    - Flowrate controlled by orifice located in ET-116 purge box near 17 in feedline elbow
  - ET-116 Purge box orifice flowrate is 56 SCFM
    - Meets design limits of 52 to 81 SCFM
    - History indicates 56 SCFM is on low end
  - Previous five Pad-A GHe bubbling differential performance range from 1.1 to 1.4 psid

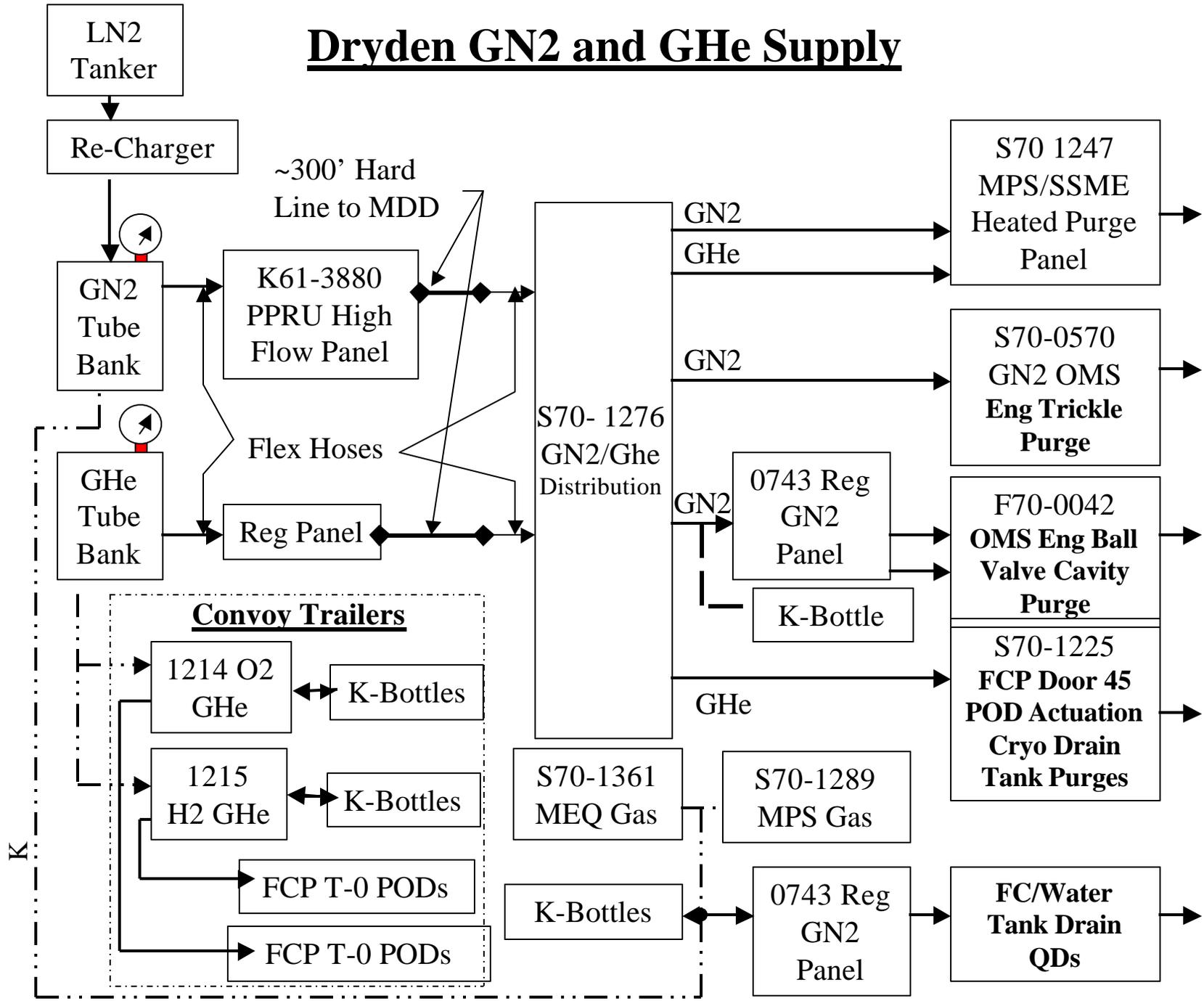
<b>ENGINEERING TOPIC HELIUM BUBBLING DIFFERENTIAL TRANSDUCER (CONT'D)</b>	<b>Presenter: Chris Connolly</b>
	<b>Organization/Date: Ground Ops/10-31-02</b>

- Actions Taken
  - Visual inspections of GHe supply system to ET interface revealed no anomalies
  - Supply pressure at the GUCP was within 700 to 800 psig (actual – 760 psig)
  - Verified ground transducer within calibrated tolerance
- Actions Planned for S0007
  - Change Exception Monitoring (EMON) lower limit from 1.0 psid to Propulsion System Integration Group (PSIG) reference table
    - Assumes maximum supply temperature and minimum inlet pressure
    - EMON lower limit change passed Cryo simulations runs

**ENGINEERING TOPIC  
HELIUM BUBBLING DIFFERENTIAL  
TRANSDUCER (CONT'D)****Presenter:****Chris Connolly****Organization/Date:****Ground Ops/10-31-02**

- Tanking Rationale
  - Modified EMON GHe bubbling purge lower limit (reference PSIG table)
    - Meets the minimum ICD flowrate of 0.54 lbs/minute
    - Ensures anti-geyser protection
  - GLS and LCC is not effected
- Risk Assessment
  - No risk to Flight and Crew's safety or mission success

# Dryden GN2 and GHe Supply



<b>GROUND LAUNCH SEQUENCER</b>	<b>Presenter:</b> <b>Chris Connolly</b>
	<b>Organization/Date:</b> <b>Ground Ops/10-31-02</b>

Ground Launch Sequencer Configuration for STS-113

- GLSDD (KLO-82-0071A) Rev 9, Change D, September 2002

<u>SSID / OMRS</u>	<u>Description and Remarks</u>
• Mask	
ECL-40	FCL 1&2 Payload Heat Exchanger flow rate
Pay-02	Payload Auxiliary RPC A&B – On
Pay-03	Payload Aft Main B&C Power – On
• Bypass	
SSME2	Engines 1,2,3 Block II ME MFV Downstream Temps 1 and 2

# GROUND LAUNCH SEQUENCER CHANGES

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

## GLS Software Changes for STS-113

- No LCC or OMRSD effected
- ESR K89376 C12 console crash command file statements implemented into SLP50 code
- PR LCA-3930 Safing program SLPG2 modified to perform Class 3 error check before setting OI PCM Control Ground Pseudo
- PR LCA-3933 Critical Perform statement added to safing program SLPG2 so program will always run in critical mode

# LOST ITEM PROBLEM REPORTS

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

## Lost Items Not Found (2 Total)

### Summary/Conclusion for all LAF PR's

- A thorough search of each area was unsuccessful in finding/retrieving the lost items
- System Engineering evaluations have concluded no adverse effect on Orbiter system operations

## Midbody

- PR-LAF-5-19-0341 Connector Cap missing
  - Weight: 6.5 grams
  - Size: 1 in OD X 0.75 in
  - Location: Port Bay 7 support beam

# LOST ITEM PROBLEM REPORTS

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

## Lost Items (Cont'd)

### Crew Module

- PR-LAF-5-19-0344 Switch Cover Identifier
  - Weight: 0.25 grams
  - Size: 8 in X 4.25 in
  - Location: Panel O8
  - ASP verified cover removed from Crew Module post landing

## FUEL CELL RUNTIME

**Presenter:**

**Chris Connolly**

**Organization/Date:**

**Ground Ops/10-31-02**

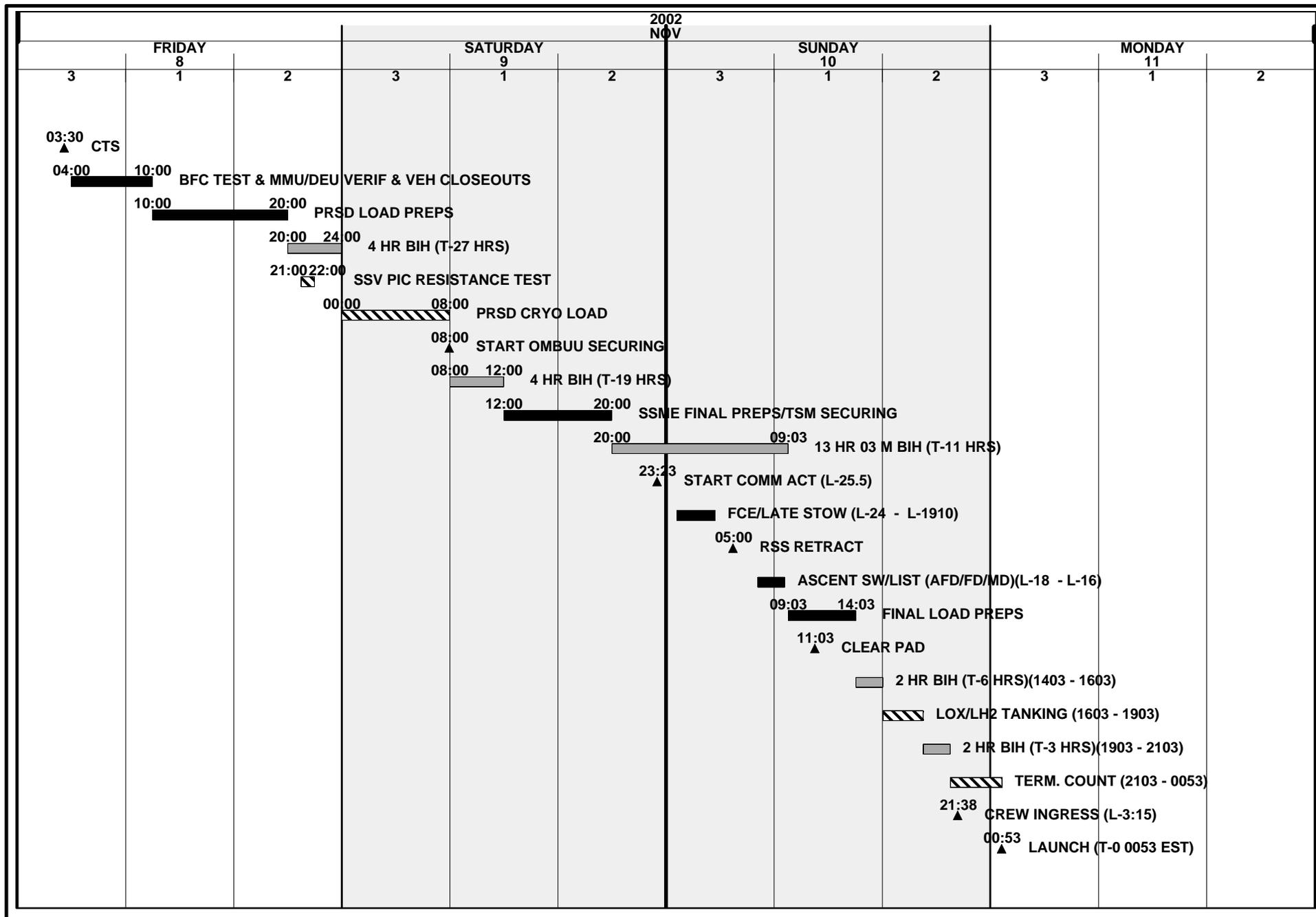
- Fuel Cell (FC) Runtime Contingency
  - Present Runtime Hours
    - FC1 s/n 109      1075
    - FC2 s/n 116      1071
    - FC3 s/n 115      395
  - Planned Runtime Usage - 342 hours
    - 10 + 1 day mission + 2 day weather avoidance days + 30 hours FC start/landing
  - Available Contingency Runtime
    - FC1    1183 hours
    - FC2    1187 hours
    - FC3    1863 hours

# STS-113 / OV-105

## Launch Countdown Summary

OPR: S. Altemus (1-9302)

22OCT02 11:46



NOTE: Actual Scrub turnaround timelines will be determined realtime based on specific conditions encountered.

# STS-113

## LCD TURNAROUND OPTIONS - NOV 11TH

OPR: S. ALTEMUS 1-9302

28OCT02

15:03

