

STS-107
FLIGHT READINESS REVIEW

January 9, 2003

Ground Operations

<h1>AGENDA</h1>	

- Shuttle Processing

- Integrated Operations
- Shuttle Engineering
- Launch and Landing
- Summary

J. Taylor

M. Young

M. Leinbach

M. Wetmore
A. Allen
C. Fontana

PROCESSING DIFFERENCES

Presenter:

Jim Taylor

Organization/Date:

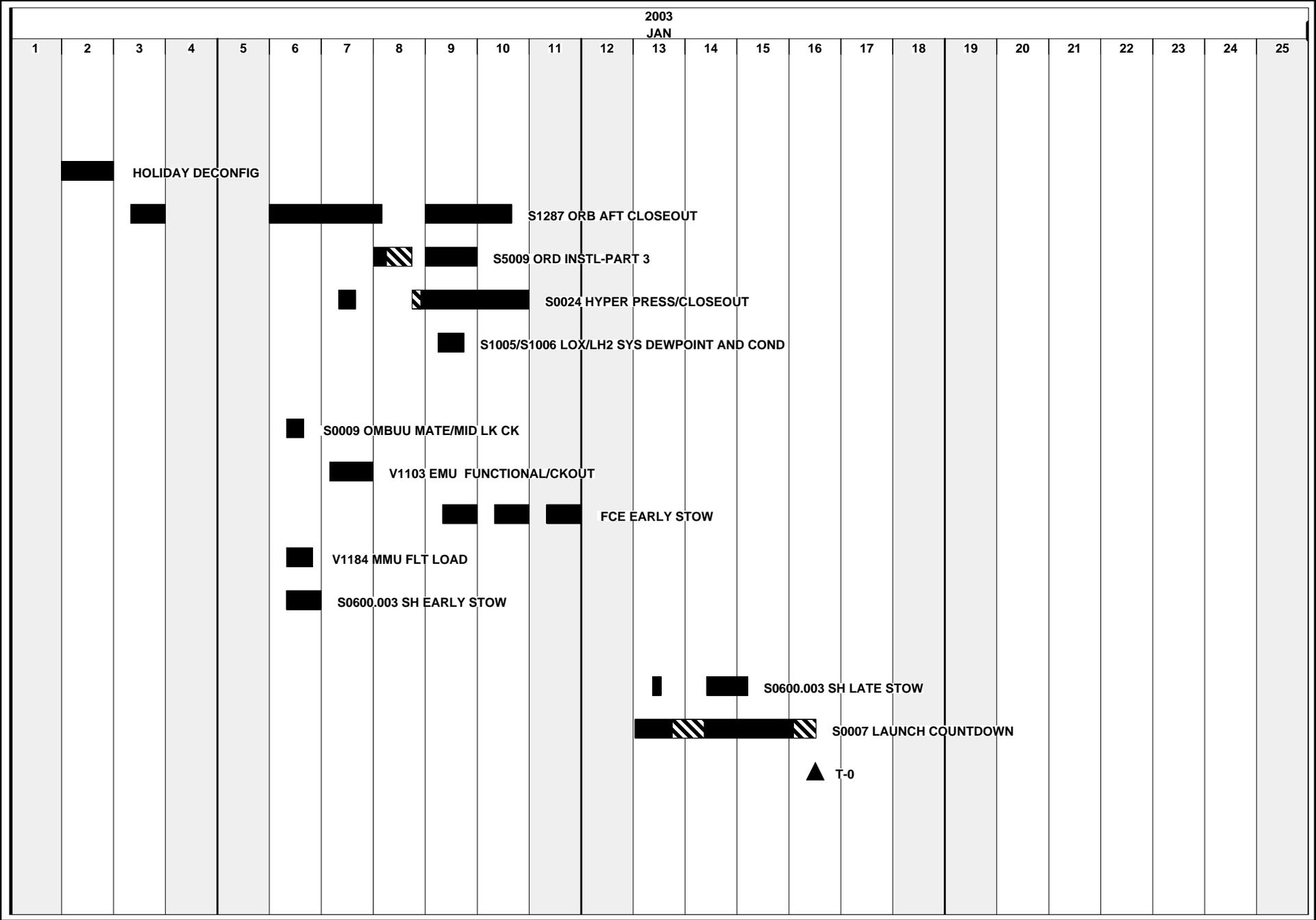
Ground Ops/01-09-03

- Processing Differences - VAB / Pad
 - Planned: Complete
 - 3 APU Confidence Run (Hotfire)
 - Unplanned: Complete
 - ECLSS O2 System Decay Test (FCP-165) during S0009
 - PRCBD S062145 - Video Quality Test for Freestar/Meidex
 - PR SB-BI-116-0005 SRB IEA cable connector inspection
- The Hold Down Post / ETVAS Pyro Anomaly
 - A recurrence control action plan was enacted following the STS-112 pyro system failure.
 - The STS-113 pyro initiation was nominal after implementation of the action plan.
 - The STS-107 action plan is consistent with the STS-113 action plan

STS-107 / OV-102 Operations Summary

OPR: USA - J. Vevera, INTEG FM (1-2567)
 NASA - J. Guidi, PH-A (1-9223)

06JAN03 08:50



SHUTTLE ENGINEERING OVERVIEW	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

The following Topics have been reviewed:

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

OMRS STATUS	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Open Waivers/Exceptions

Waiver/ Exception#	System	Title	Status
WKxxxx	HYD	Ref: PR HYD-2-28-1197 V58A10.020-A: Hydraulic fluid leakage at a swaged reducer at the outlet side of brake isolation valve #1 (50V58LV26)	To VECB: 1/10/03 Leak check performed at 500 psi circulation pressure. No leakage detected in 30 minutes

OMRS STATUS	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Open Waivers/Exceptions (Cont'd)

Waiver/ Exception#	System Title	Status
EKG10310	Swing Arms Ref: U70-0503-00-001-0949 File VI OMRS G51FEGPA0.013 Pad A Orbiter Access Arm retract time is nominally 100 sec, should be between 105 and 140 sec	To PRCB: 1/10/03 Historically the OAA retract time has been measured and verified only against the max requirement. Exceeding min retract time has had no detrimental effect on Pad A OAA and launch structure hardware

INFLIGHT ANOMALY STATUS	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

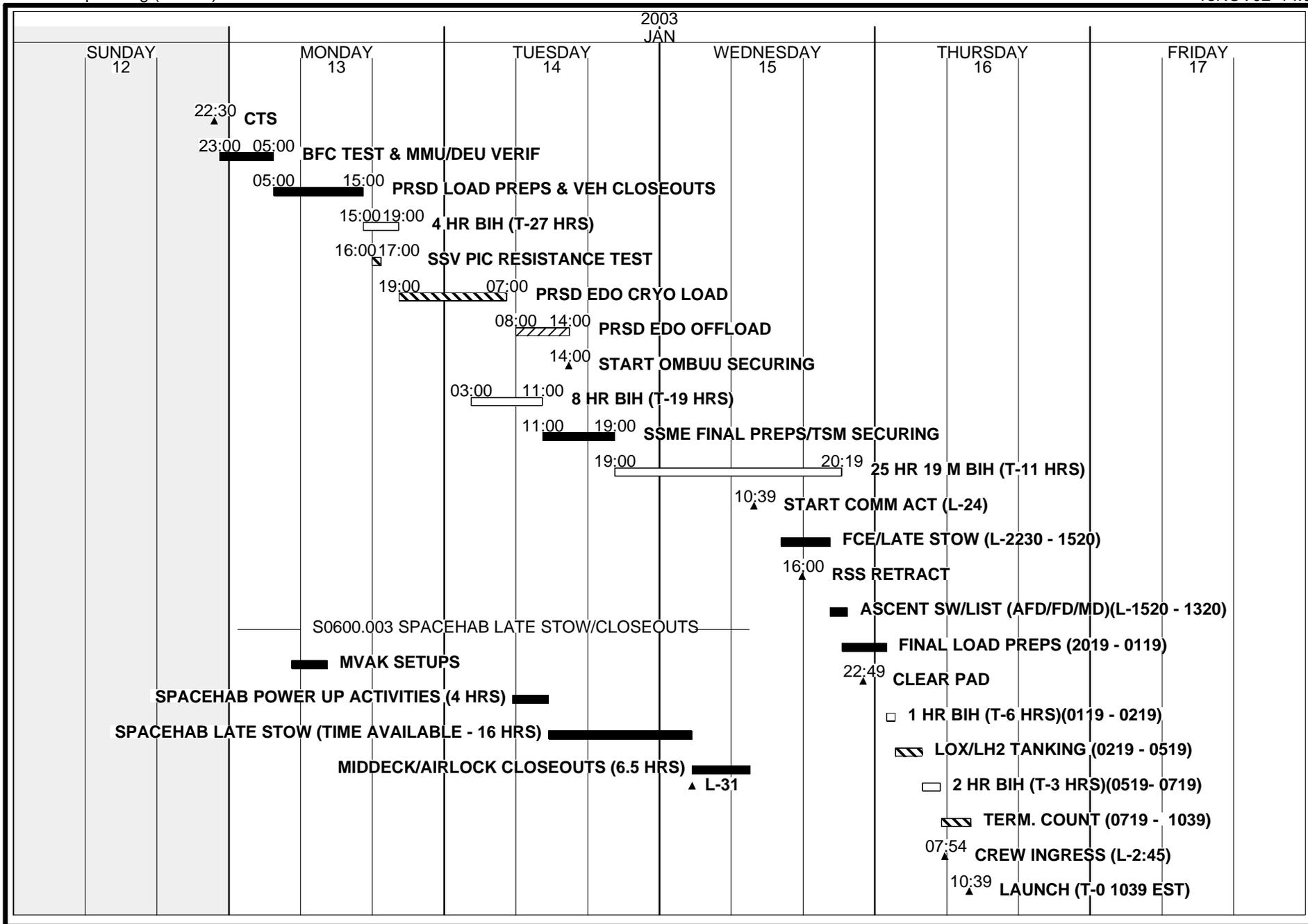
<u>KSC IFA #</u>	<u>Description and Remarks</u>	<u>ECD</u>
STS-113-K-01:	Orbiter Access Arm manual valves out of configuration. Investigation revealed a procedural error/omission. Procedure has been corrected and issue closed at PRCB	Closed 1/6/03
STS-113-K-02:	Facility Platform Contacted RMS. This issue is not applicable to STS-107	2/6/03

STS-107 / OV-102

Launch Countdown Summary

OPR: J. Spaulding (1-9306)

13NOV02 14:09

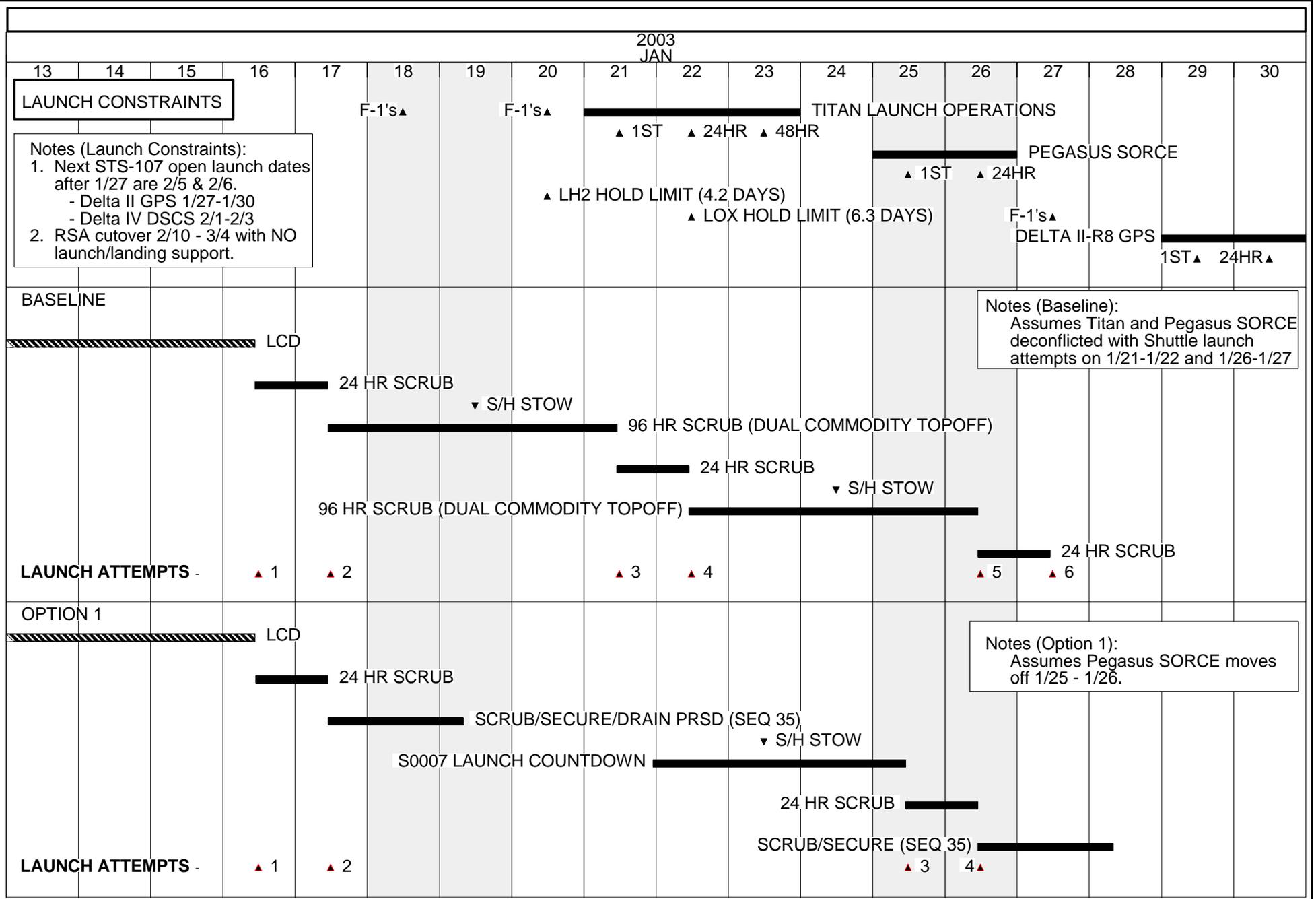


NOTE: Actual Scrub turnaround timelines will be determined realtime based on specific conditions encountered.

STS-107

LAUNCH COUNTDOWN TURNAROUND OPTIONS

OPR: J. Spaulding (1-9306)
06JAN03 11:37



LANDING OPERATIONS STATUS

Presenter:

Mike Leinbach

Organization/Date:

Launch & Landing/01-09-03

- **Launch Support**
 - ❖ **RTLS:** KSC
 - ❖ **TAL:**
 - Moron (Prime) Deploy at L-6 days, Jan 10, 2002
 - Zaragoza (Alt) Deploy at L-6 days, Jan 10, 2002
 - ❖ **AOA:**
 - DFRC/EDW (Prime) Deploy at L-2 days, Jan 14, 2002
 - KSC/WSSH (Alt)
- **Mission Support**
 - ❖ KSC (Prime EOM)
 - ❖ DFRC/EDW Deploy at L-2 days, Jan 14, 2002
 - ❖ WSSH
- **Site Status**
 - ❖ Ben Guerir will not be manned for STS-107





Kennedy Space Center Shuttle Processing Team



STS-107 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/Charles J. Fontana

Charles J. Fontana
APM, Integrated Logistics,
USA

S/Andrew A. Allen

Andrew A. Allen
APM, Ground Operations,
USA

S/Michael E. Wetmore

Michael E. Wetmore
Director of Shuttle Processing,
NASA



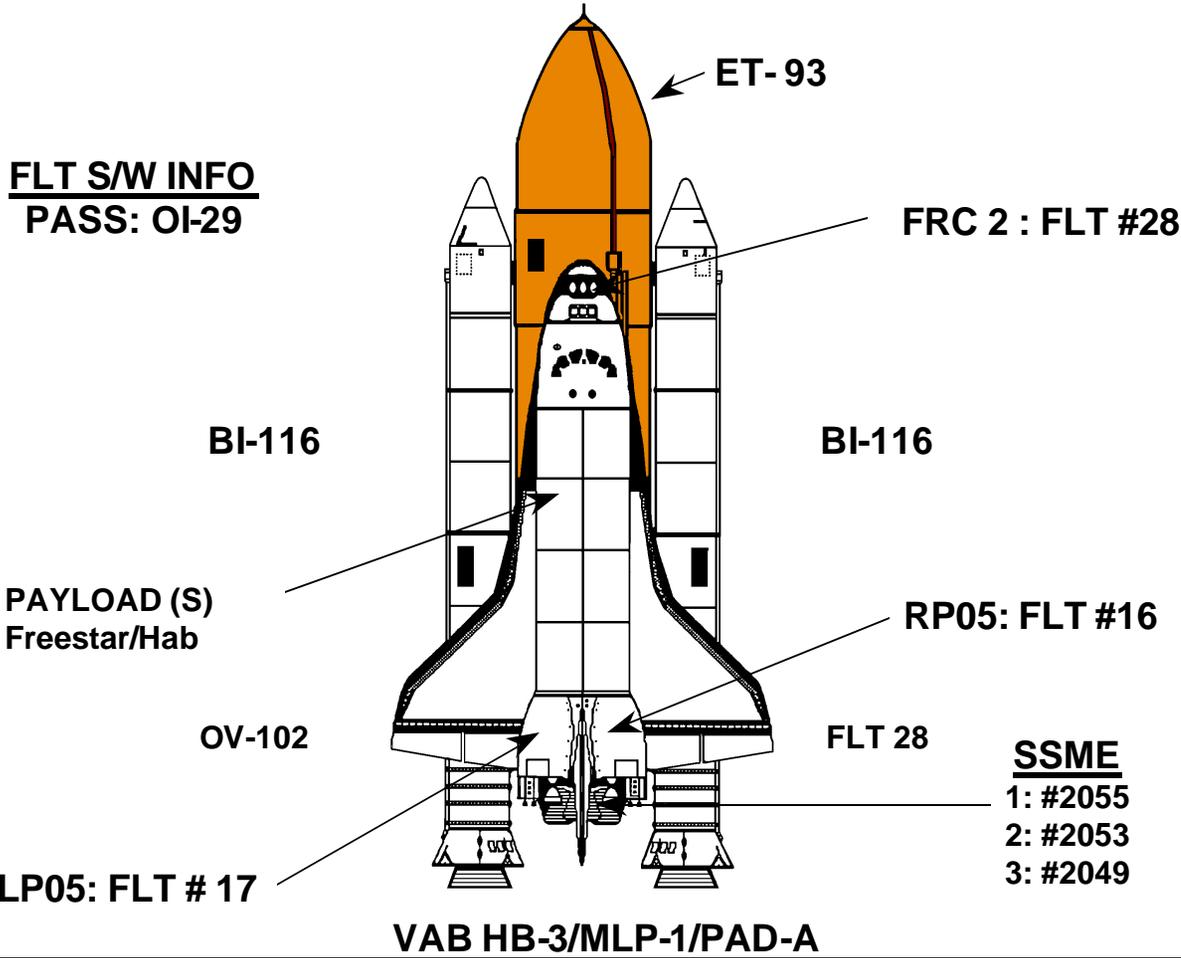
STS-107
FLIGHT READINESS REVIEW
BACKUP

January 9, 2003

Ground Operations

STS-107 INTEGRATED STACK CONFIGURATION: HARDWARE/ SOFTWARE

Presenter:
Mike Young
Organization/Date:
Ground Ops/01-09-03



GROUND LAUNCH SEQUENCER

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

Ground Launch Sequencer Configuration for STS-107

- GLSDD (KLO-82-0071A) Rev 9, Change E, November 2002

**SSID /
OMRS**

Description and Remarks

- 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
 - CT-01 TACAN 1, 2 & 3 Range Built in Status Word
& Range Suppression Pulse Present (Gould)

GROUND LAUNCH SEQUENCER

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

Ground Launch Sequencer Configuration for STS-107

- GLSDD (KLO-82-0071A) Rev 9, Change E, November 2002

**SSID /
OMRS**

Description and Remarks

- Bypass

SSME2 Engines 1,2,3 Block II

ME MFV Downstream Temps 1 and 2

None Photo Camera Sequencer Start Not Required

None B/P of GCU 1 Sel Ind not req for 1203 GCU's

None B/P of timer #4 (GCDKTIM4E). Timer #4 is no longer required by NTD

LOST ITEM PROBLEM REPORTS

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

Lost Items Not Found (18 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

LOST ITEM PROBLEM REPORTS

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

WAD Number	Loc.	Description	L&F Log ID#	Search Time (Hours)	Weight and Size
LAF-2-28-0629 (LAF-2-A0020)	FWD	Nut plate (MD114-5004-0004) lost in FRCS cavity. Approx. size .95" x .42" x .25", material - A286 cress.	716	0	1.8 gram - 0.25 in. X 0.95 in X 0.42 in
LAF-2-28-0624	FWD	Strap V519-634106-004 was detected missing from an ECL duct in the airlock during V5050.001	707	8	14.5 grams - 0.5 in. X 14.5 in. long
LAF-2-28-0628	FWD	After installation of angle bracket V070-316138-011 at attach point 11, two rivet tails were unavoidably dropped into the FRCS cavity.	715	0	0.05 gram - 0.094 in. dia X 0.318 in long
LAF-2-28-0617	MID	Backshell tang on connector 40V7752P9344 (L/H bay 1 BWT) was broken and lost while working ECL-2-28-1514.	702	8	2 grams - 0.5 in. long X 0.4 in.
LAF-2-28-0618	MID	While working in the Payload Bay, it was noticed that a metal plate was missing from a SuperSabre flashlight (Model # 2000C). Unknown how long the parts have been missing.	699	11	0.1 grams - 0.24 in. dia X 0.02 in. thick
LAF-2-28-0618	MID	While working in the Payload Bay, it was noticed that a spring was missing from a SuperSabre flashlight (Model # 2000C). Unknown how long the parts have been missing.	700	11	0 grams - 0.2 in. dia X 0.2 in. long
LAF-2-28-0618	MID	While working in the Payload Bay, it was noticed that a vent cap was missing from a SuperSabre flashlight (Model # 2000C). Unknown how long the parts have been missing.	701	11	0.06 grams - 0.25 in. dia X 0.03 in. thick
LAF-2-28-0619	MID	Pin broke off inspection mirror (GA51AP) and fell in bay 2 R/H side at Xo 636, while working ECL-1525. Initial 30 min search did not locate the pin.	703	8	0.2 grams - 0.1 in. dia X 0.2 in. long
LAF-2-28-0620	MID	TCS blankets buttons missing mid-body blankets. Buttons are missing throughout, from bay 1 to the AFT bulkhead.	708	11	0.5 grams - 0.9 in. dia

LOST ITEM PROBLEM REPORTS

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

WAD Number	Loc.	Description	L&F Log ID#	Search Time (Hours)	Weight and Size
LAF-2-28-0625	AFT	While attempting to mate connector 50V77V31P765 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (MD112-1003-020) screw.	709	9	1 gram - 0.25 in. head dia X 0.4 0.4 in long
LAF-2-28-0625	AFT	While attempting to mate connector 50V77V31P765 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (NAS620C6) flat washer.	710	9	0.3 grams - 0.25 in. dia X 0.02 in. thick
LAF-2-28-0625	AFT	While attempting to mate connector 50V77V31P765 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (MS35338-136) split lock washer.	711	9	0.3 grams - 0.25 in. dia X 0.03 in. thick
LAF-2-28-0625	AFT	While attempting to mate connector 50V77V31P765 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (MS35649-264) nut. Hardware not found in surrounding area.	712	9	1 gram - 0.3 in. dia X 0.1 in. thick
LAF-2-28-0626	AFT	While attempting to mate connector 50V77W13P511 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (MD112-1003-0210) screw.	713	8	1 gram - 0.25 in. head dia X 0.4 0.4 in long
LAF-2-28-0626	AFT	While attempting to mate connector 50V77W13P511 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (NAS620C6) flat washer.	713	8	0.3 grams - 0.25 in. dia X 0.02 in. thick
LAF-2-28-0626	AFT	While attempting to mate connector 50V77W13P511 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (MS35338-136) split lock washer.	713	8	0.3 grams - 0.25 in. dia X 0.03 in. thick
LAF-2-28-0626	AFT	While attempting to mate connector 50V77W13P511 to solenoid valve on LH2 2" line, found ground wire for connector not attached to backshell. The hardware required is 1 (MS35649-264) nut. Hardware not found in surrounding area.	713	8	1 gram - 0.3 in. dia X 0.1 in. thick
LAF-2-28-0627	AFT	During removal of 50-1 threshold assy., nut was dislodged from cage and entered into AFT interior along L/H sidewall.	714	8	0.5 gram - 0.38 in. dia X 0.38 in X 0.19 in. thick

UNEXPLAINED ANOMALIES ENGINE #1 PREVALVE INDICATION DROP OUT

Presenter:

Mike Young

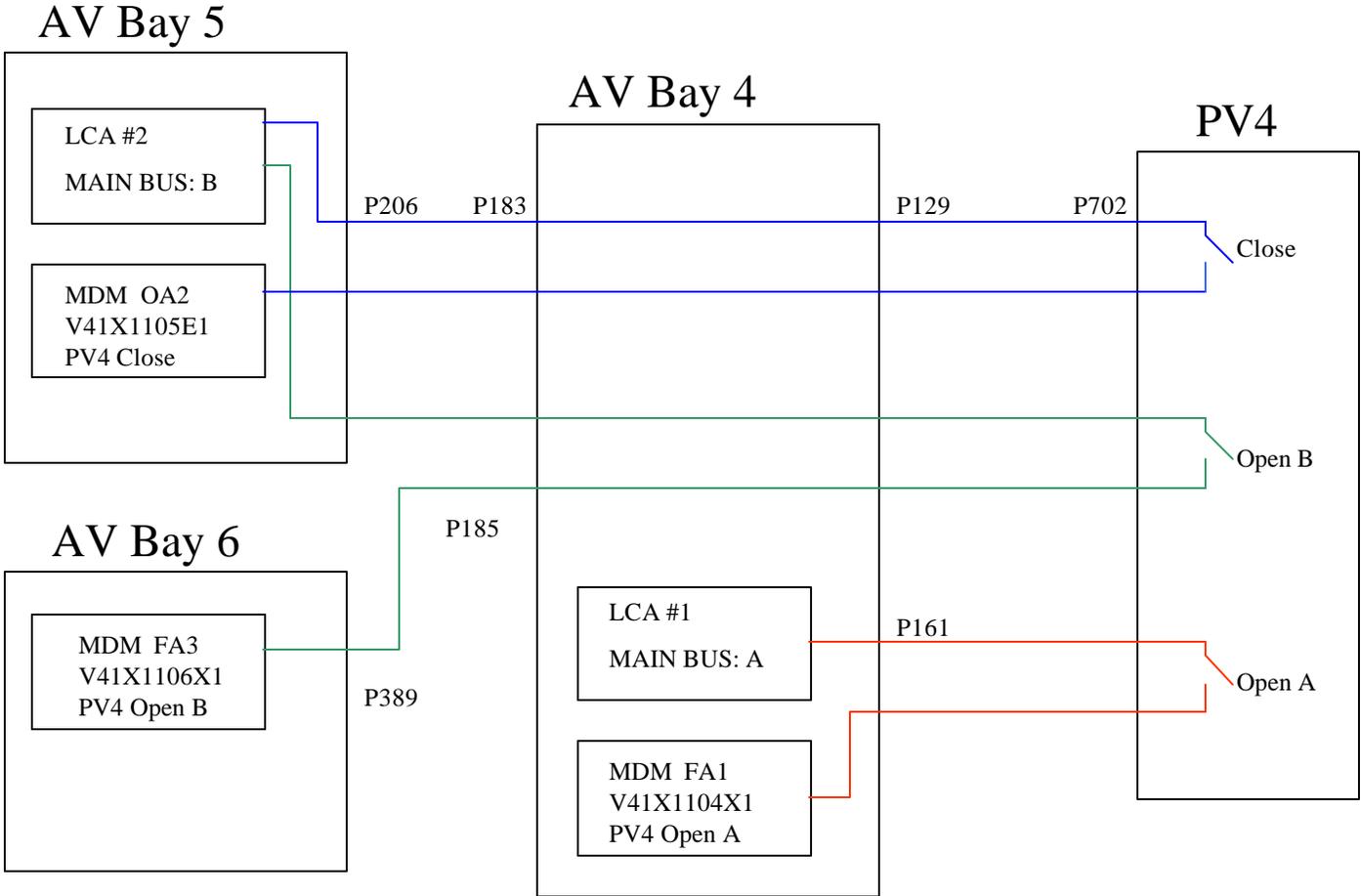
Organization/Date:

Ground Ops/01-09-03

- Observation
 - During STS-109 ascent the Engine #1 LH2 Prevalve open 'A' indication experienced a drop out after SSME shut down
 - Drop out occurred 14 minutes after valve was opened for LH2 dump
 - The open 'B' indication operated nominally (remained ON)
 - No data dropout occurrences during troubleshooting
- Concerns
 - A repeat of the anomaly coupled with a failure of the redundant open 'B' indication at T-7 seconds (s) would cause a countdown hold
 - No concerns after engine start through remainder of mission

UNEXPLAINED ANOMALIES ENGINE #1 PREVALVE INDICATION DROP OUT (CONT'D)

Presenter:
Mike Young
Organization/Date:
Ground Ops/01-09-03



**UNEXPLAINED ANOMALIES
ENGINE #1 PREVALVE INDICATION
DROP OUT (CONT'D)****Presenter:****Mike Young****Organization/Date:****Ground Ops/01-09-03**

- Discussion
 - 5 prior Unexplained Anomaly (UA) occurrences of Prevalve open indication signal drop outs
 - 2 on OV-102 Engine #3 LH2 (during STS-035 processing)
 - 3 on OV-104 Engine #1 LH2 (2 during STS-044/079 processing and 1 on STS-104 ascent)
 - No occurrences during cryogenic loading or launch count
 - Most probable cause for all 5 UA's was an intermittent short or open in the indicator electrical circuit
 - All occurred during times of heavy work traffic, or on ascent
 - Launch Commit Criteria requirement is for 1 of 2 open indications at T-7 s - valve opening
 - Indications not used for remainder of mission

**UNEXPLAINED ANOMALIES
ENGINE #1 PREVALVE INDICATION
DROP OUT (CONT'D)****Presenter:****Mike Young****Organization/Date:****Ground Ops/01-09-03**

- Actions Taken
 - A tap check was performed on the Prevalve actuator
 - No drop outs
 - Valve electrical connector was de-mated and inspected
 - No anomalies noted
 - Isolated valve from vehicle wiring
 - Micro switch was tested – no anomalies
 - Vehicle wiring wiggled while monitoring voltage – no signal noise
 - Convoluted tubing removed and wire harness inspected near valve connector
 - No damage
 - Open 'A' indication monitored during daily power-up
 - No drop outs

UNEXPLAINED ANOMALIES ENGINE #1 PREVALVE INDICATION DROP OUT (CONT'D)

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

- Possible Causes
 - Mechanical failure of the micro switch
 - Intermittent mechanical failure is highly unlikely
 - Improper switch adjustment would result in multiple occurrences
 - No previous switch failures
 - An intermittent short or open in the indicator electrical circuit
 - All occurrences have been during high traffic periods in aft fuselage or during ascent
- Most Probable Cause
 - An intermittent short or open in the indicator electrical circuit

**UNEXPLAINED ANOMALIES
ENGINE #1 PREVALVE INDICATION
DROP OUT (CONT'D)****Presenter:****Mike Young****Organization/Date:****Ground Ops/01-09-03**

- Flight Rationale
 - The open indication is only required at T-7 prior to engine start
 - Only 1 of 2 indications required
 - Failure of both (redundant) open indications is highly unlikely
 - Prevalve open indication is not monitored for on-orbit propellant dump or re-entry inerting
 - No history of failures during cryogenic load or terminal count
 - Proper valve operation will be verified after Aft close out
- Risk Assessment
 - No risk to Flight and Crew's safety or Mission success

ENGINEERING TOPICS

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

- STS-107 Potential Hold Down Post Pyro Failure (T-0 Connectors)
- Orbiter Access Arm (OAA) Lower Actuator Hydraulic Leakage
- Payload Bay Purge Configuration with EDO Pallet

**ENGINEERING TOPIC
POTENTIAL HOLD DOWN POST
PYRO FAILURE****Presenter:****Mike Young****Organization/Date:****Ground Ops/01-09-03**

- 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

- Concerns
 - Potential for a similar loss of one level of system redundancy for HDP and ETVAS pyrotechnics for STS-107

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE (CONT'D)	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Discussion
 - The most probable cause for the STS-112 failure was attributed to the failure of a single wire path at the T-0 interface
 - A recurrence control plan was enacted for STS-113 and STS-107
 - The STS-107 action plan is consistent with the STS-113 action plan
 - The T-0 carrier plate, T-0 electrical connections and all ordnance functioned nominally for STS-113

**ENGINEERING TOPIC
POTENTIAL HOLD DOWN POST
PYRO FAILURE (CONT'D)****Presenter:****Mike Young****Organization/Date:****Ground Ops/01-09-03**

- Actions Taken
 - On the Orbiter
 - Replaced all orbiter T-0 connector savers
 - J71, J53, J59 and J63 connector savers were safety wired due to loose bayonet pins
 - Videoscope of the orbiter T-0 connector savers performed prior to T-0 mate. Verified all three bayonet pins engaged
 - On MLP #1
 - Replaced and tested the 8' T-0 carrier plate interface cables prior to orbiter mate
 - Long-run cables recently replaced (LDB issue)
 - The Pyro Ground Cables from the TSM bulkhead plate to the Terminal Distributor and from the Terminal Distributor to the PIC rack have been checked for insulation resistance, electrical isolation and continuity

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE (CONT'D)	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Actions Taken (Cont'd)
 - During T-0 Mate
 - Videoscope performed during orbiter T-0 connector mate. Verified at least two bayonet pins engaged following mate
 - Standard Shuttle Integrated Testing (S0008)
 - Shuttle/Pad Interface Testing (S0009)
- Actions in Work
 - Ordnance Installation and Test (S5009)
 - ARM, Fire 1, and Fire 2 command path verification
 - PIC Capacitor discharge verification

ENGINEERING TOPIC POTENTIAL HOLD DOWN POST PYRO FAILURE (CONT'D)	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- 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-107 launch as a result of the STS-112 HDP/ETVAS Pyro Failure
- Flight Rationale
 - The Orbiter T-0 electrical connector savers have been replaced and inspected
 - The T-0 connector mate was videoscoped
 - The T-0 carrier plate interface cables have been replaced and tested
 - The MLP wire paths have been tested and inspected
 - Pyro System checkout will be performed prior to launch

ENGINEERING TOPIC ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Observation
 - Orbiter Access Arm (OAA) console personnel noted a higher than expected hydraulic pressure decrease in the standby system during the final STS-113 tanking on 11-23-02. (Ref IPR 113V-0079)
- Concerns
 - Excessive OAA internal hydraulic system leakage could cause a slow OAA retraction when commanded at T-7:30
 - Failure to meet the requirements of LCC GSE-12 could cause a launch scrub

**ENGINEERING TOPIC
ORBITER ACCESS ARM (OAA)
ACTUATOR HYDRAULIC LEAKAGE****Presenter:****Mike Young****Organization/Date:****Ground Ops/01-09-03**

- Discussion
 - The Pad A OAA lower actuator hydraulic leakage has been documented, quantified and accepted by MR since 2000
 - PR U70-0503-00-001-0821 documents a 35 cc/min leak at 2700 psi(max allowable is 0.5 cc/min)
 - Leakage changes each time the OAA is cycled
 - The STS-113 observed leakage appears to have increased to 50 cc/min at standby pressure
 - During STS-113 scrub T/A console personnel documented a slope change on the hydraulic standby pressure indicating an increase in leakage
 - Pad A OAA extend and retract times have remained consistent throughout the leak history
 - Extend: 16 seconds (30 sec max allowed)
 - Retract: 100 seconds (140 sec max allowed)

**ENGINEERING TOPIC
ORBITER ACCESS ARM (OAA)
ACTUATOR HYDRAULIC LEAKAGE****Presenter:****Mike Young****Organization/Date:****Ground Ops/01-09-03**

- Actions Taken
 - A spare actuator was authorized in 2000 and delivered Spring 2002. The spare is being validated at LETF
 - Post STS-113 Pad A validation has cycled the arm and quantified the lower actuator leakage
 - 50 cc/min at standby pressure (70-80 psi)
 - 75 cc/min at operating pressure (2700 psi)
 - An OAA extension test was run after S0009 Shuttle/Pad Integration test to quantify and baseline leakage for S0007
 - 50 cc/min at standby pressure (70-80 psi)
 - 80 cc/min at operating pressure (2700 psi)

ENGINEERING TOPIC ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Actions Planned
 - Establish a standardized monitoring routine and working limits to be checked after OAA/GVA/HCU system activations to assure system integrity prior to T-11H and counting. Formalize through use of checklist
 - Utilize PC Goal plotting capabilities to define system data profiles not readily discernable from LPS
 - Determine system data and trend profiles required for performance acceptance
 - Develop and maintain baseline (reference) configuration plots for each pad
 - Establish PC Goal workstation configuration to download for all subsequent missions

ENGINEERING TOPIC ORBITER ACCESS ARM (OAA) ACTUATOR HYDRAULIC LEAKAGE	Presenter: Mike Young
	Organization/Date: Ground Ops/01-09-03

- Risk Assessment
 - Based on the leak and timing data obtained to date, there is no increased risk for STS-107 launch as a result of the STS-113 OAA lower actuator leakage
- Flight Rationale
 - No safety of flight impact

FUEL CELL RUNTIME

Presenter:

Mike Young

Organization/Date:

Ground Ops/01-09-03

- Fuel Cell (FC) Runtime Contingency
 - Present Runtime Hours
 - FC1 s/n 117 1709
 - FC2 s/n 111 1419
 - FC3 s/n 103 1702
 - Planned Runtime Usage - 447 hours
 - 16 day mission + 2 weather contingency days + 15 hours FC start/landing
 - Available Contingency Runtime
 - FC1 344 hours
 - FC2 634 hours
 - FC3 351 hours

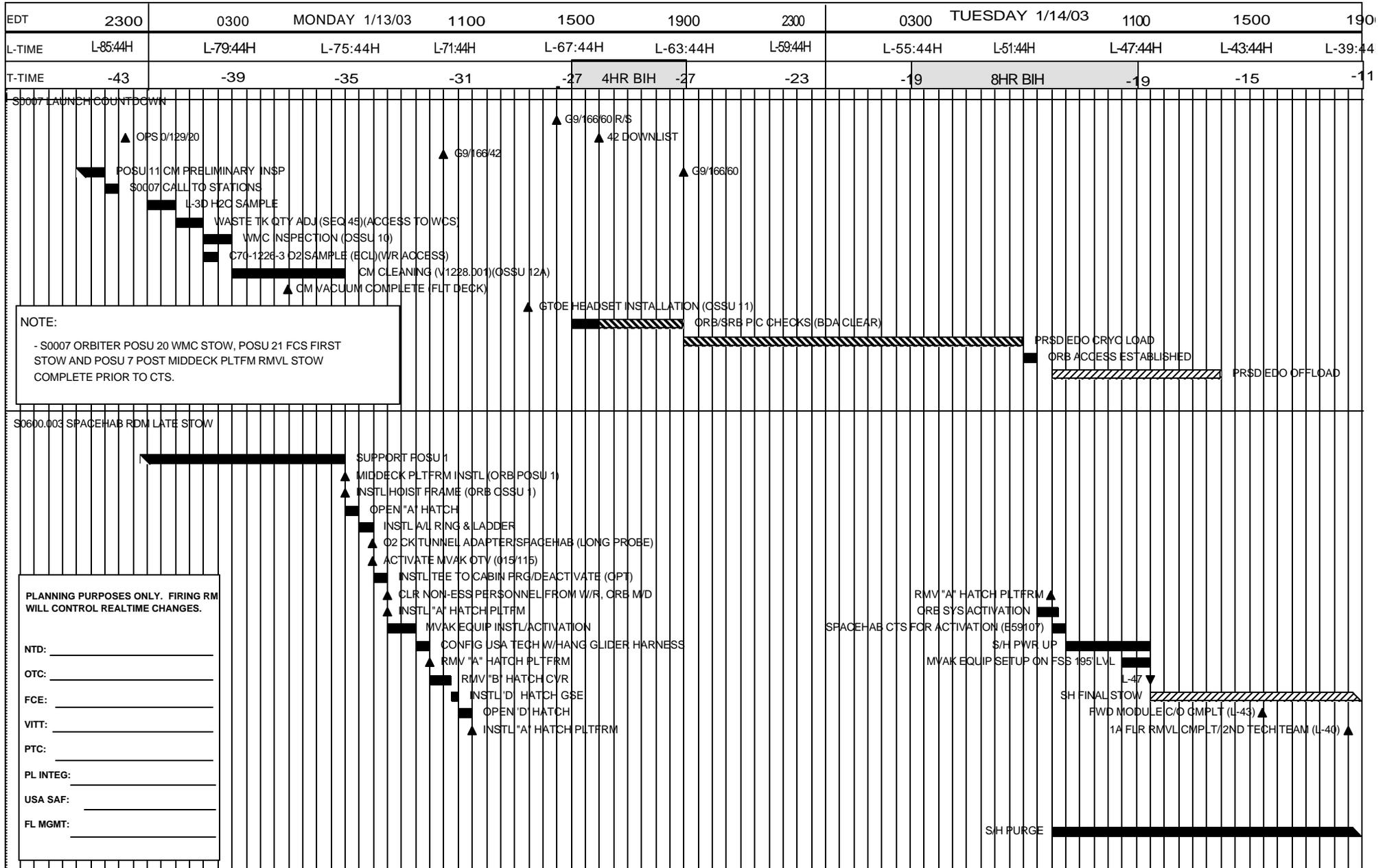
STS-107
FLIGHT READINESS REVIEW
BACKUP

Launch and Landing

STS-107 S0007/S0600.003/TPS-FCS-XXX

Crew Module Interface Chart

30 MINUTE INCREMENTS



STS-107 S0007/S0600.003/TPS-FCS-XXX Crew Module Interface Chart

30 MINUTE INCREMENTS

