VEHICLE ENGINEERING

	Presenter:
	Organization/Date: Orbiter/08-01-01

ORBITER	**To Be Presented**
SOFTWARE	**No Constraints**
FCE	**No Constraints**
GFE	**No Constraints**
FLIGHT READINESS STATEMENT	**To Be Presented**
BACKUP	

STS-105
PROGRAM
FLIGHT READINESS REVIEW

AUGUST 1, 2001

Orbiter

AGENDA

Presenter:

Organization/Date:
Orbiter/08-01-01

Engineering Readiness Assessment	
• Previous Flight Anomalies	To Be Presented
• Critical Process Changes	To Be Presented
• Configuration Changes and Certification Status	To Be Presented
• Mission Kits	No Constraints
Special Topics	None

	Presenter:
	Organization/Date: Orbiter/08-01-01

PREVIOUS FLIGHT ANOMALIES

	Presenter:
	Organization/Date: Orbiter/08-01-01

STS-102 INFLIGHT ANOMALIES

PREVIOUS IN-FLIGHT ANOMALIES

Presenter: Doug White

Organization/Date: Orbiter/08-01-01

STS-102 In-Flight Anomalies, Previous OV-103 Mission:

- Two Orbiter problems identified as in-flight anomalies
  - STS-102-V-01: Degraded Freon Coolant Loop 1 Flow Due to Radiator Icing
  - STS-102-V-02: ROMS Vapor Isolation Valve 2 Open Position Indicator Failed to Indicate Open

Information provided in Backup

All Anomalies and Funnies Have Been Reviewed and None Constrain STS-105 Flight

	Presenter:
	Organization/Date: Orbiter/08-01-01

STS-104 INFLIGHT ANOMALIES

PREVIOUS IN-FLIGHT ANOMALIES

Presenter: Doug White

Organization/Date: Orbiter/08-01-01

STS-104 In-Flight Anomalies, Previous Mission:

- Four Orbiter problems identified as in-flight anomalies
  - STS-104-V-01: Forward Bulkhead Floodlight Coldplate Return Line Low Temperature
  - STS-104-V-02: FES Hi-Load and Accumulator Feedline A System 1 Heater Failed Off
  - STS-104-V-03: Loss of Ku-Band Forward Link
  - STS-104-V-04: Vent Door 8 & 9 Limit Switch Anomaly

All Anomalies and Funnies Have Been Reviewed and None Constrain STS-105 Flight

STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT	Presenter: Doug White Organization/Date: Orbiter/08-01-01

Observation:

- Forward bulkhead floodlight coldplate Water Coolant Loop 1 (WCL 1) temperature dropped to 36ºF

Concern:

- Water line temperatures below 32ºF will result in freezing and possible coldplate or water line damage

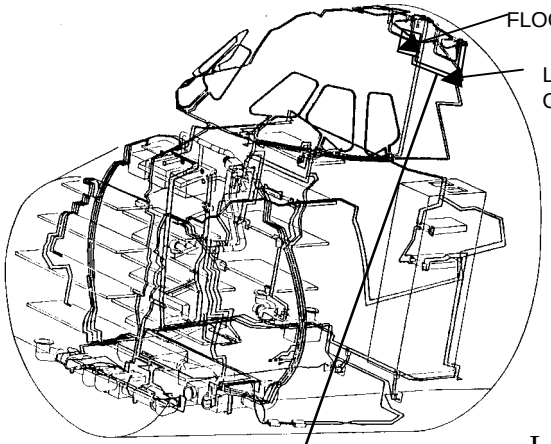
Discussion:

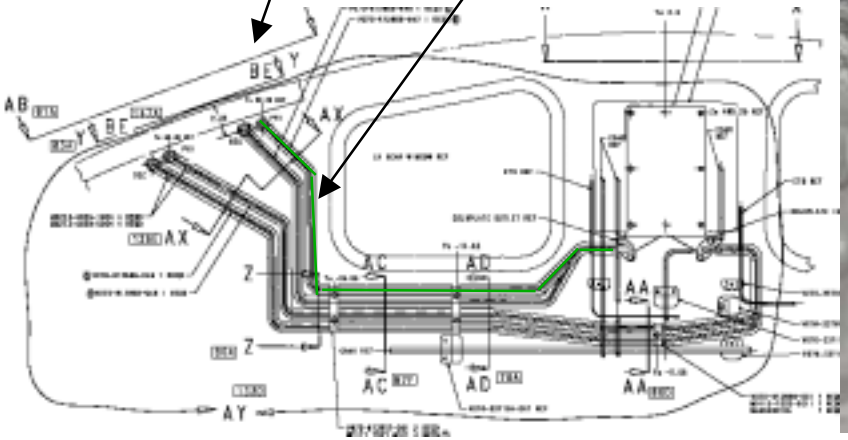
- Floodlight coldplate water lines are installed on the aft side of the Xo576 bulkhead and exposed to the payload bay thermal environment
- Lines are wrapped with LT-80 aluminum tape for thermal conductivity and insulated from space with MLI blankets
  - Aluminum tape allows heat conduction from active WCL 2 to passive WCL 1

STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:
Doug White

Organization/Date:
Orbiter/08-01-01





STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:
Doug White
Organization/Date:
Orbiter/08-01-01

OV-103 Closeout Picture

STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT	Presenter: Doug White Organization/Date: Orbiter/08-01-01

Discussion:

- WCL 1 is cycled ‘on’ by GPC automatically every 4 hrs for 6 minutes duration to keep water from freezing
  - Cycling raises line temperature using heat from cabin
  - Analysis and flight data show WCL 1 temperature will remain well above freezing with this cycle frequency
- Temperature dropped to 36ºF at MET 1:17 hr
  - WCL 1 temperature dropped as low 31ºF (STS-106) during the three previous flights
    - WCL 1 cycle frequency was changed to once per hour and the temperature remained well above freezing for the rest of the mission

STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT	Presenter: Doug White Organization/Date: Orbiter/08-01-01

Discussion: (Cont)

- Possible causes:
  - Sensor debonding
  - Insulation not per print
  - Low flow rate in WCL2
- Temp sensor performance is nominal, evidenced by good temp response (~75ºF) during loop cycling
- STS-104 temperature signature closely tracked the attitude timeline thermal conditions indicating a problem with the line insulation or a lack of heat transfer between WCL 2 and WCL 1
- Post-flight inspection has located a 10-inch section of WCL 1 and WCL 2 that is not properly wrapped with LT-80 tape
  - Unwrapped section is at the temp sensor

STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT	Presenter: Doug White Organization/Date: Orbiter/08-01-01

Risk Assessment/Acceptable for STS-105 Flight:

- No risk to STS-105, OV-103
- Review of previous OV-103 flight data shows WCL 1 temperature remained above 50ºF for similar vehicle attitude profiles
- Photos from this flow show proper installation of MLI blanket
- No work performed in this area that may have disturbed the line insulation

FES H_2O FEED LINE A HEATER STRING 1 FAILED

Presenter:
Doug White
Organization/Date:
Orbiter/08-01-01

Observation:

- FES hi-load and accumulator H_2O feed line A, heater 1 failed off

Discussion:

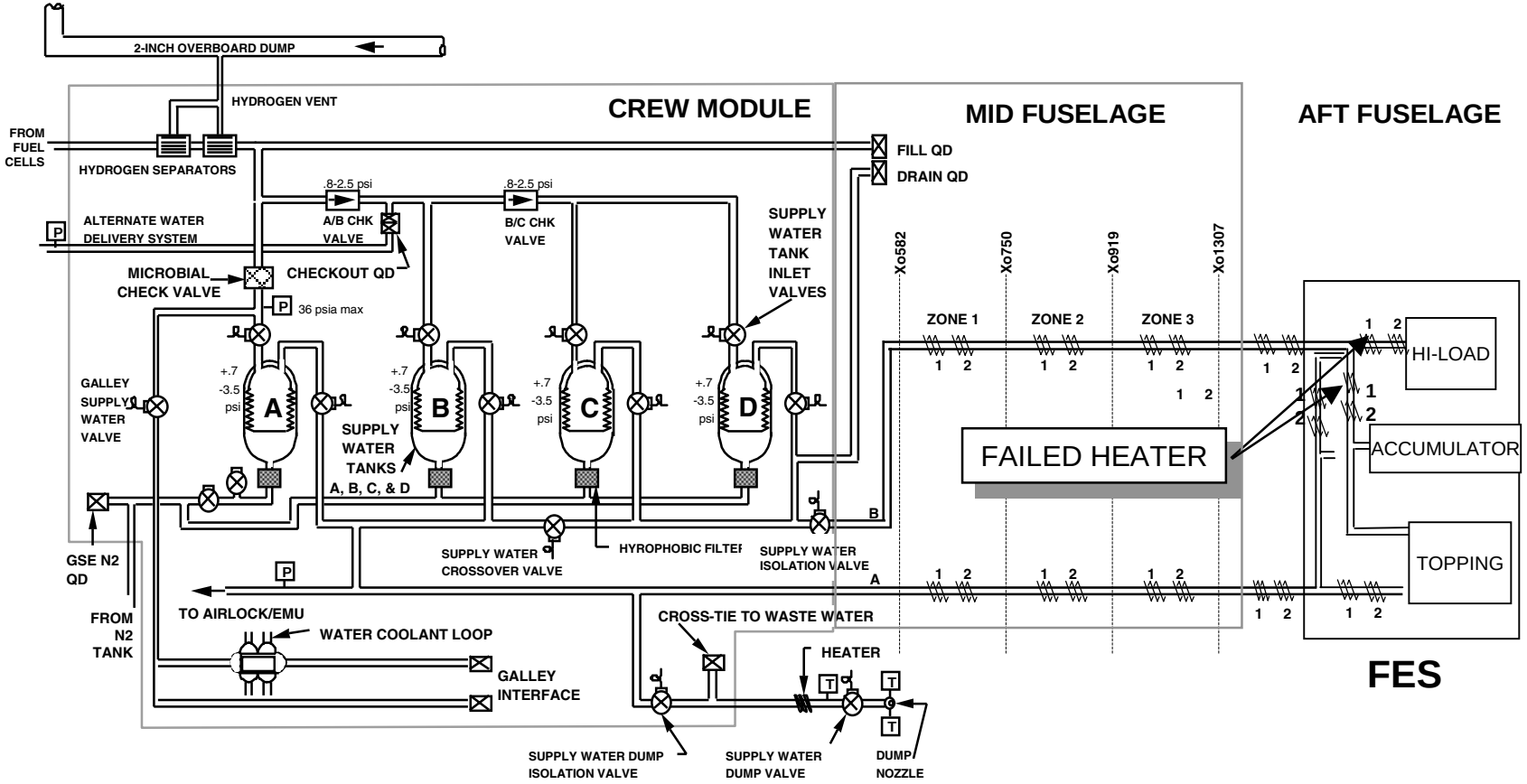
- Two redundant heater strings provide water line temperature control to prevent freezing
  - Hi-load line temperatures cycle between 150ºF and 180ºF
  - Accumulator line temperatures typically cycle between 75ºF and 95ºF
- The heater performed nominally until approximately MET 003:13:00
  - Line temperatures dropped to 90ºF and 53ºF respectively
  - Data showed heater cycling before failing indicating possible thermostat failure
- Crew switched to redundant heater string which performed nominally for the rest of the mission

FES H_2O FEED LINE A HEATER STRING 1 FAILED

Presenter: Doug White

Organization/Date: Orbiter/08-01-01

SUPPLY WATER SYSTEM



FES H_2O FEED LINE A HEATER STRING 1 FAILED

Presenter: Doug White
Organization/Date: Orbiter/08-01-01

Risk Assessment:

- With the loss of both heater strings, a contingency procedure to purge the affected line is available to prevent freezing and allow recovery of the system for entry

Actions Planned:

- Post-flight troubleshooting will be performed to isolate the cause of the anomaly

Acceptable for STS-105 Flight:

- FES heater string operation was verified as part of in-flight checkout OMRS File IX requirements during the last OV-103 mission (STS-102) and through ground checkout
- In the event of a heater failure, the redundant heater string may be used
- Procedures to prevent freezing and recover the line for entry are available if both heaters fail

STS-104 KU-BAND FAILURE TO ACQUIRE FORWARD LINK COMMUNICATION

Presenter: Doug White

Organization/Date: Orbiter/08-01-01

Observation:

- During STS-104 mission, Ku-Band failed to acquire forward link communication

Concern:

- Inability to acquire Ku-Band forward link will result in loss of voice and command

Discussion:

- Anomaly occurred during eight separate occasions

ORBIT	Start time GMT	End time GMT	Cumulative dropout time	Comment
127	201:10:39	201:11:17	38	Power recycled, TDRS west
148	202:18:01	202:18:30	29	TDRS west
153	203:02:51	203:03:18	27	TDRS east
154	203:04:20	203:04:26	6	TDRS east
163	203:17:02	203:18:39	1 hour 37 min	TDRS west
165	203:20:57	203:22:26	1 hour 29 min	TDRS east
168	204:01:49	204:02:47	58 minutes	Power recycled TDRS east
170	204:05:12	204:06:11	59 minutes	TDRS east

STS-104 KU-BAND FAILURE TO ACQUIRE FORWARD LINK COMMUNICATION	Presenter: Doug White Organization/Date: Orbiter/08-01-01

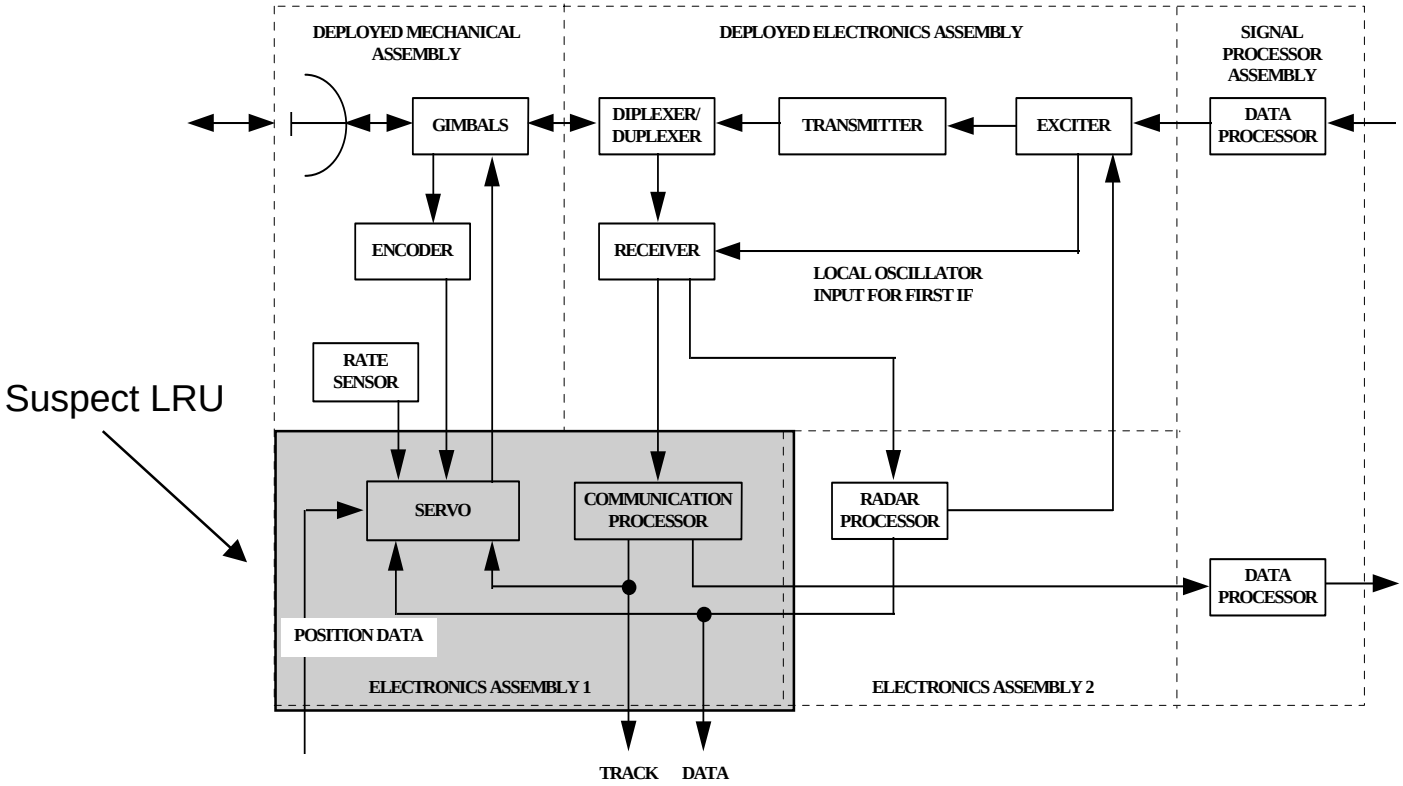
Discussion: (Cont)

- Review of flight data suggests that problem is most likely associated with the Electronic Assembly-1 (EA-1) LRU located in avionics bay 3A
  - EA-1 is responsible for processing the forward link communication signal
  - Communication AGC and detect & track flags are generated within the EA-1
    - Detect & track flags were absent during the dropout period
- Post-flight troubleshooting planned to isolate problem
- The OV-104 Ku-Band LRU flight experience ranges from 10-20 flights with 3 flights as an integrated system
- Comparison of this failure signature to Ku-Band failure history does not show any evidence of a trend or generic problem

STS-104 KU-BAND FAILURE TO ACQUIRE FORWARD LINK COMMUNICATION

Presenter:
Doug White
Organization/Date:
Orbiter/08-01-01

Ku-Band Functional Diagram



STS-104 KU-BAND FAILURE TO ACQUIRE FORWARD LINK COMMUNICATION	Presenter: Doug White Organization/Date: Orbiter/08-01-01

Risk Assessment:

- Inability to acquire Ku-Band forward link results in loss of voice and command
- Ku-Band system is criticality 1R3 for the observed failure (loss of state vector updates)
- S-Band system provides backup capability
  - No coverage when S-Band antennas are pointing towards Orbiter nose/tail

Acceptable for STS-105 Flight:

- Based upon the observed failure signature, there is no evidence to suggest a generic problem associated with the EA-1 hardware
- OV-103 has successfully completed all Ku-Band OMRSD testing

STS-104 OV-104: LEFT HAND VENT DOORS 8 & 9 LIMIT SWITCH ANOMALY	Presenter: Doug White Organization/Date: Orbiter/08-01-01

Observation:

- Left hand vent doors 8 & 9 OPEN limit switch #2 temporarily failed off during entry

Concern:

- Potential launch delay if both switches fail
  - LCC requires one of two OPEN indications prior to launch

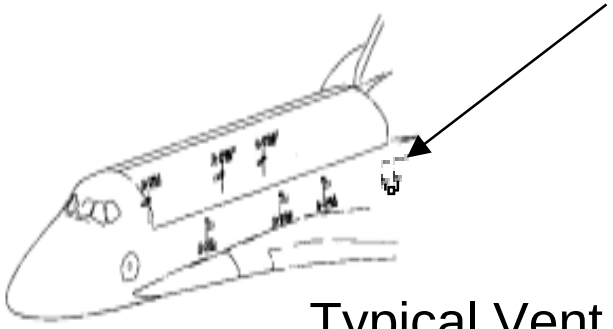
Discussion:

- After entry interface the vent doors are commanded open
- Left hand vent door 8 & 9 CLOSED indication went off and the motor 1 OPEN went on as expected
- Motor 2 OPEN indication failed off and motor 2 continued to run
  - After driving for 10 seconds (single-motor run time), motor 2 was shut down normally by software
  - Approximately 1 minute and 45 seconds later the motor 2 OPEN indication came on
- RH Vent doors 8 & 9 operated normally

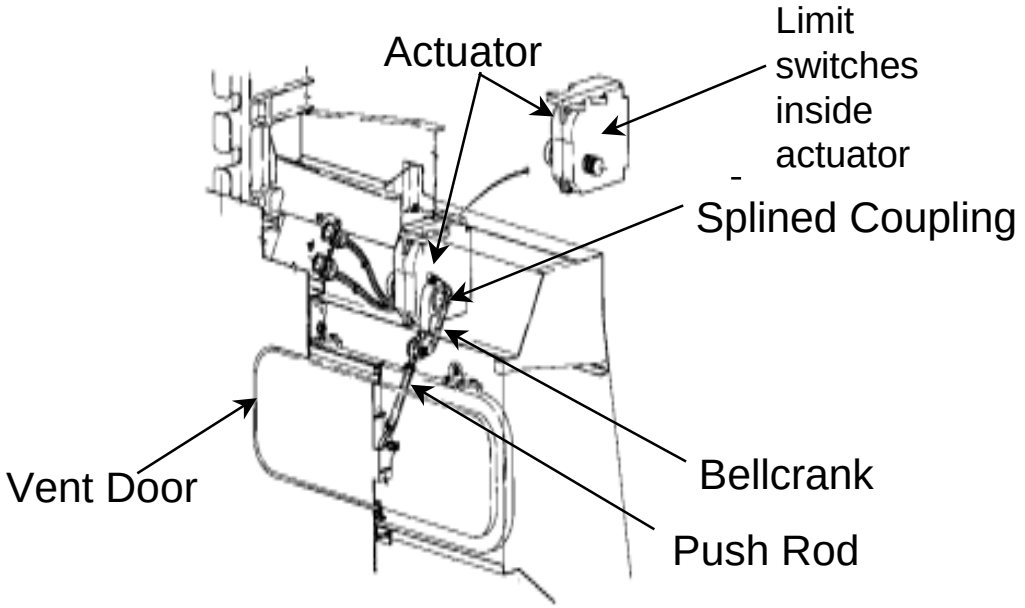
STS-104 OV-104: LEFT HAND VENT DOORS 8 & 9 LIMIT SWITCH ANOMALY

Presenter:
Doug White
Organization/Date:
Orbiter/08-01-01

Location of Vent Door # 8 & 9 - AFT Fuselage



Typical Vent Door Actuator



STS-104 OV-104: LEFT HAND VENT DOORS 8 & 9 LIMIT SWITCH ANOMALY	Presenter: Doug White Organization/Date: Orbiter/08-01-01

Risk Assessment:

- Purpose of OPEN limit switch is to turn off motor when door is opened
- Without OPEN indication, actuator continues to run and stalls against mechanical hard stops until terminated by software
  - Actuator certified for prolonged stall operation
  - Loss of OPEN indication for this condition does not inhibit motor operation
- Worst case anomaly could cause launch delay due to LCC requirements if both switches fail
  - One of two switch indications required prior to launch
- This failure mode is criticality 3/3
  - No impact during a mission

Acceptable for STS-105 Flight:

- OV-103 has successfully completed all vent door OMRSD testing

	Presenter:
	Organization/Date: Orbiter/08-01-01

CRITICAL PROCESS CHANGES

STS-105 CRITICAL PROCESS CHANGE REVIEW SUMMARY

Presenter: Doug White

Organization/Date: Orbiter/08-01-01

Item Reviewed	No. of Items Reviewed	Period or Effectivity Covered	No. Found To Be Critical Process Changes
OMRSD Changes (RCNs)	7	STS-105 Specific & Non-Flight Specific Changes Approved 5/3/01 – 6/3/01	0
OMRSD Waivers & Exceptions	10	STS-105 Specific	0
IDMRD Changes (MCNs)	10	Approved 5/3/01 – 6/3/01	0
IDMRD Waivers & Exceptions	1	Approved 5/3/01 – 6/3/01	0
EDCPs	2	Closed 5/3/01 – 6/3/01	1
Boeing Specifications	17	Released 5/3/01 – 6/3/01	0
Boeing Drawings	263	Released 5/3/01 – 6/3/01	0
Material Review	154	Approved 5/3/01 – 6/3/01	0

- All process changes were reviewed and none constrain STS-105

CRITICAL PROCESS CHANGES	Presenter: Doug White Organization/Date: Orbiter/08-01-01

EDCP FCR-15368, Fuel Cell Powerplant NVR Verification Changes

- This EDCP changes vendor NVR verification processes to reflect current industry practices utilizing HFE-7100 as a flush solvent instead of water. Component compatibility with new solvent and dry out processes verified by combination of analysis and test.
- Requirement for NVR verification was removed from FCP component hardware not exposed to oxygen fluid flow. This change restores original intent of NVR requirement and reduces vendor costs.

	Presenter:
	Organization/Date: Orbiter/08-01-01

CONFIGURATION CHANGES

CONFIGURATION CHANGES AND CERTIFICATION STATUS

Presenter: Doug White

Organization/Date: Orbiter/08-01-01

8 Modifications Were Incorporated During The STS-105 Processing Flow

- MCR 17177 Aft Fuselage Ballast Shim Mod
- MCR 19376 Lightweight Locker Upgrades
- ➔ MCR 18755 Fwd & Aft Winch Pip Pin and Safety Wire Mod
- ➔ MCR 18755 RSK Recumbent Mission Specialist Cushions
- MCR 18755 External Airlock Bag/Strap Velcro Removal
- MCR 18755 Lightweight Locker Latch Mod
- MCR 19535 Heat Shrink-fit Tubing For Pyro Harnesses
- MCR 19605 ODS Centerline Camera Harness Redesign

➔ First time flight for this modification

- Details provided in the Backup Section

CONFIGURATION CHANGES AND CERTIFICATION STATUS

Presenter: Doug White

Organization/Date: Orbiter/08-01-01

STS-105 Certified Flight Configuration - MEC/MEC

- AMEC S/N 3 in slot 1 has been removed from OV-103 due to recent AMEC S/N 10 failures detected at SAIL
  - Failure analysis is in-work
  - AMEC failure signature detectable during pre-installation OMRS testing at the KATS lab
- MEC S/N 12 has been installed in slot 1
  - MEC S/N 12 passed all OMRS testing in the KATS lab and following installation on the vehicle
  - MECs have an excellent flight history (170 flights) and have never exhibited the current AMEC failure
- MEC S/N 4 has been installed in slot 2 following the recent EMEC S/N 3 failure (failed core redundancy test)
  - MEC S/N 4 passed all pre-installation OMRS testing in the KATS lab
  - MEC S/N 4 has had extensive flight exposure successfully supporting 19 missions

	Presenter:
	Organization/Date: Orbiter/08-01-01

FLIGHT READINESS STATEMENT

SPACE SHUTTLE VEHICLE ENGINEERING OFFICE

STS-105 (OV-103) ☐ **ORR** ☒ **FRR** ☐ **Prelaunch MMT**

Pending completion of scheduled open work, the Orbiter vehicle, support hardware, flight crew equipment, and software are certified and ready to support. For United Space Alliance accountable functions, insight, audit, and surveillance activities have been reviewed, and there are no constraints to flight.

ORBITER / FLIGHT SOFTWARE / FLIGHT CREW EQUIPMENT

7-25-01
P. E. Shack, Manager, Shuttle Engineering Office

D. S. Rasco, Manager, Flight Crew Equipment Management Office

7/23/2001
D. E. Stamper, TMR, Software

J. P. Mulholland, TMR, Orbiter and Flight Crew Equipment

REMOTE MANIPULATOR SYSTEM

S. Higson, Program Director, SRMS McDonald Dettwiler and Advanced Robotics Limited

R. Allison, RMS Project Manager 19 July 01

SPACE VISION SYSTEM

L. Beach, Program Manager, SVS NEPTEC

D.S. Moyer, SVS Integration Office

FERRY FLIGHT PLANNING

7/20/01
D. L. McCormack, Ferry Flight Manager

Ralph R. Roe, Manager
Space Shuttle Vehicle Engineering

ORB-RRS 2

USA SSVEO Functions

STS-105 (OV-103) FLIGHT READINESS STATEMENT

☐ ORR ☒ FRR ☐ Prelaunch MMT

PENDING COMPLETION OF SCHEDULED OPEN WORK, THE ORBITER VEHICLE, SUPPORT HARDWARE, FLIGHT CREW EQUIPMENT, AND SOFTWARE ARE CERTIFIED AND READY TO SUPPORT.

ORBITER / FLIGHT SOFTWARE

G. A. Ray, Program Director, Orbiter
Human Space Flight and Exploration
The Boeing Company

J. Wilder, Associate Program Manager
Orbiter Element
United Space Alliance

T. F. Peterson, Associate Program Manager
Flight Software Element
United Space Alliance

FLIGHT CREW EQUIPMENT

20 JUN 01

E. L. Young, FCE/EVA Associate Program Manager
United Space Alliance

ORB-RRS 3

	Presenter:
	Organization/Date: Orbiter/08-01-01

BACKUP INFORMATION

	Presenter:
	Organization/Date: Orbiter/08-01-01

STS-102
IN-FLIGHT ANOMALIES
BACKUP

DEGRADED FCL 1 FLOW DUE TO RADIATOR ICING	Presenter:
	Organization/Date: Orbiter/08-01-01

Observation:

- Freon Loop 1 flow reduction due to icing in Freon, and consequently, flow blockage

Concern:

- Loss of radiator cooling if unable to remove ice

Discussion:

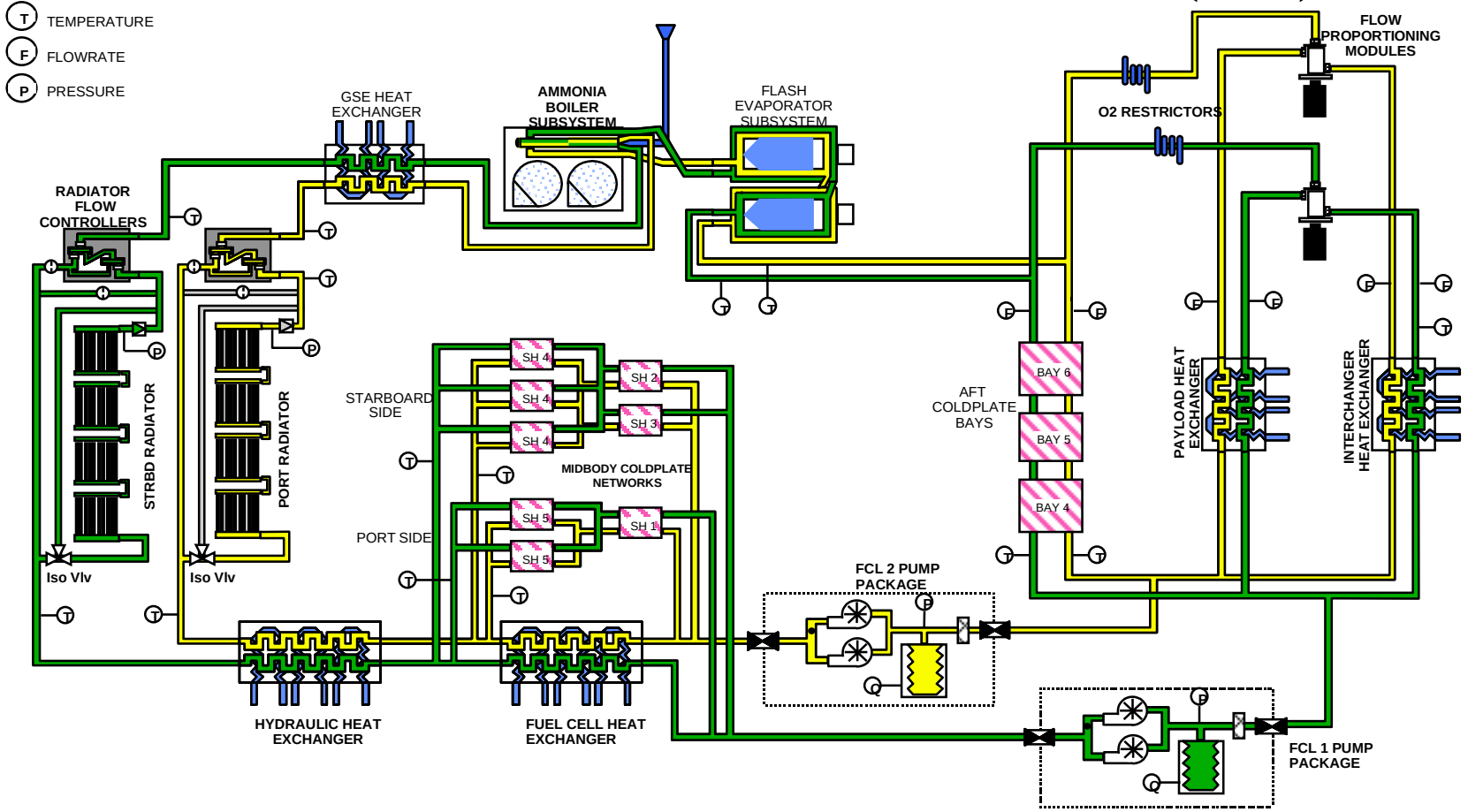
- During STS-102 Docking period, a FES water dump was performed with RFCA in “High” setting
- Radiator Freon temp dropped from -18°F to as low as -82°F and flow decreased
- Cause of icing attributed to radiator being too cold, although current flight rule allows -85°F min Freon temp
  - Similar problem was observed during STS-28 and STS-35

DEGRADED FCL 1 FLOW DUE TO RADIATOR ICING

Presenter:

Organization/Date:
Orbiter/08-01-01

ORBITER ACTIVE THERMAL CONTROL SYSTEM (ATCS)



DEGRADED FCL 1 FLOW DUE TO RADIATOR ICING	Presenter:
	Organization/Date: Orbiter/08-01-01

Action Taken:

- Freon post-flight sample showed water content of 44 ppm and 50 ppm in FCL 1 and 2 vs. 15 ppm max OMRSD allowable limit
- Freon sample confirmed that radiator freezing was due to high moisture content
- Both FCLs have been re-serviced with new Freon
  - FCL 1 with 6 ppm moisture is within 15 ppm max limit
  - FCL 2 with 23 ppm requires a waiver to fly
    - –82F Water-in-Freon solubility temperature
    - Minimum predicted for STS-105 is -20F per pre-flight analysis based on nominal planned attitude
    - -65F panel temperature expected during radiator cold soak per previous flight data
- Investigation to determine the cause of moisture content increase is ongoing

DEGRADED FCL 1 FLOW DUE TO RADIATOR ICING	Presenter:
	Organization/Date: Orbiter/08-01-01

Risk Assessment:

- Minimum risk to STS-105
  - Procedure in place to correct the problem in flight, should radiator freezing occur

Acceptable For STS-105 Flight:

- Both FCLs have been re-serviced with new Freon
- Minimum radiator temperature analysis prediction is anticipated to be above freezing temperature based on new sample data

OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION

Presenter:

Organization/Date:
Orbiter/08-01-01

Observation:

- During last two (of 8) right OMS (RP03) engine burns, vapor isolation valve #2 (LV506, S/N 25) failed to indicate open

Concern:

- Lack of insight into valve function without valve position indication (VPI)

Discussion:

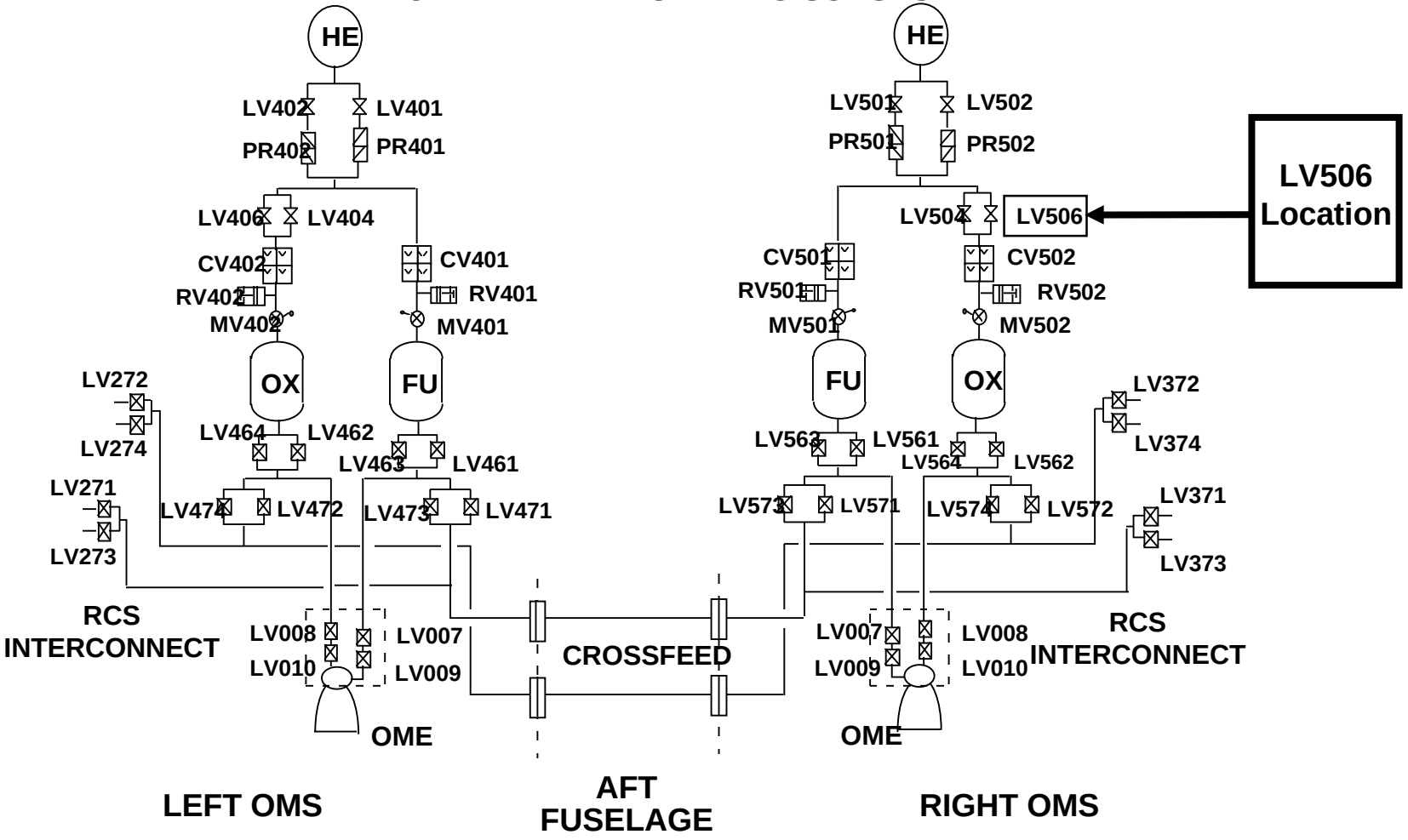
- Vapor iso valves 1 and 2 were commanded open via cockpit switch prior to each OMS engine burn
  - Valve 1 indicated open and valve 2 did not indicate open
- Valve function cannot be determined in-flight without VPI
  - A single cockpit switch throw controls both valves
    - Two switches available for this function
  - No system operation impact because valves 1 and 2 are in parallel, with valve 1 providing a redundant flow path
  - Tank pressures verified at least one flow path was open

OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION

Presenter:

Organization/Date:
Orbiter/08-01-01

ORBITAL MANEUVERING SUBSYSTEM

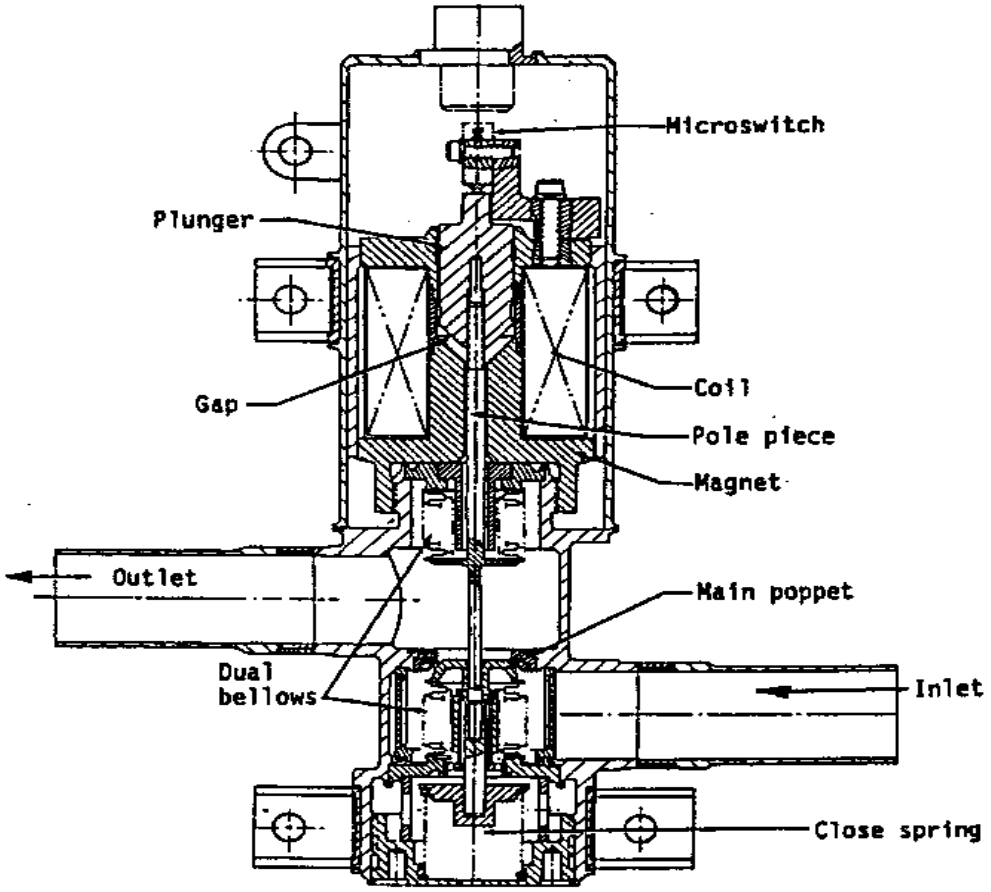


OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION

Presenter:

Organization/Date:
Orbiter/08-01-01

CROSS-SECTION OF THE OMS ISOLATION VALVE



OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION	Presenter:
	Organization/Date: Orbiter/08-01-01

Discussion: (Cont)

- Prior to STS-70 (OV-103 Flt 21), LV506 (S/N 17) on RP03 experienced an intermittent VPI problem
  - Valve indicated open when commanded closed, valve operation nominal
  - Failure analysis on valve has not revealed a cause (still in-work)
- S/N 17 valve was replaced with S/N 25
  - STS-102 was the second flight of this valve since installation
  - No anomalies noted during first flight (STS-92)
- No single point failure would cause both VPI problems - (failed open/not open)
- There is no history of a vapor iso valve failing open or closed

OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION

Presenter:

Organization/Date:
Orbiter/08-01-01

Actions Taken/Planned:

- Possible causes of failure evaluated
  - Contamination/corrosion in the valve switch
  - Wiring problem
  - MDM failure (FA4)
    - Vapor iso valve 2 VPI signal goes through MDM FA4, card D
- Troubleshooting conducted revealed no cause for the failure
  - A BITE test 4 was performed - no anomalies with MDM FA4 were found
  - Orbiter wiring connectors were checked and no discrepancies were evident
  - Valve cycling performed with break out boxes installed revealed power being supplied to both the solenoid and the VPI circuits
  - Wire wiggle test performed
  - Valve function was nominal during troubleshooting

OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION	Presenter:
	Organization/Date: Orbiter/08-01-01

Actions Taken/Planned: (Cont)

- No troubleshooting internal to OMS pod was performed due to lack of access with pod installed
- Documented as a UA/Deferred PR
  - Most probable cause is an intermittent wiring problem in the RP03 VPI circuitry
  - Additional troubleshooting planned (deferred PR) at upcoming OMDP

OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION	Presenter:
	Organization/Date: Orbiter/08-01-01

Risk Assessment:

- Failed close valve (Crit 1R/2)
  - Failed closed valve eliminates redundancy in the flow path
    - Ability to pressurize OMS oxidizer tank is lost if both vapor isolation valves fail closed
  - Worst case of valve failure is assumed if VPI anomaly (open/close) occurs due to inability to determine valve function without VPI
  - Propellant utilization would be per existing flight rules
    - Only propellant from the affected pod tank would be used first to maximize ullage for blowdown capability
    - Unbalanced deorbit burn would be performed per flight rules
      - Feed two OMEs from one pod until quantities are balanced, then switch to straight feed

OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION	Presenter:
	Organization/Date: Orbiter/08-01-01

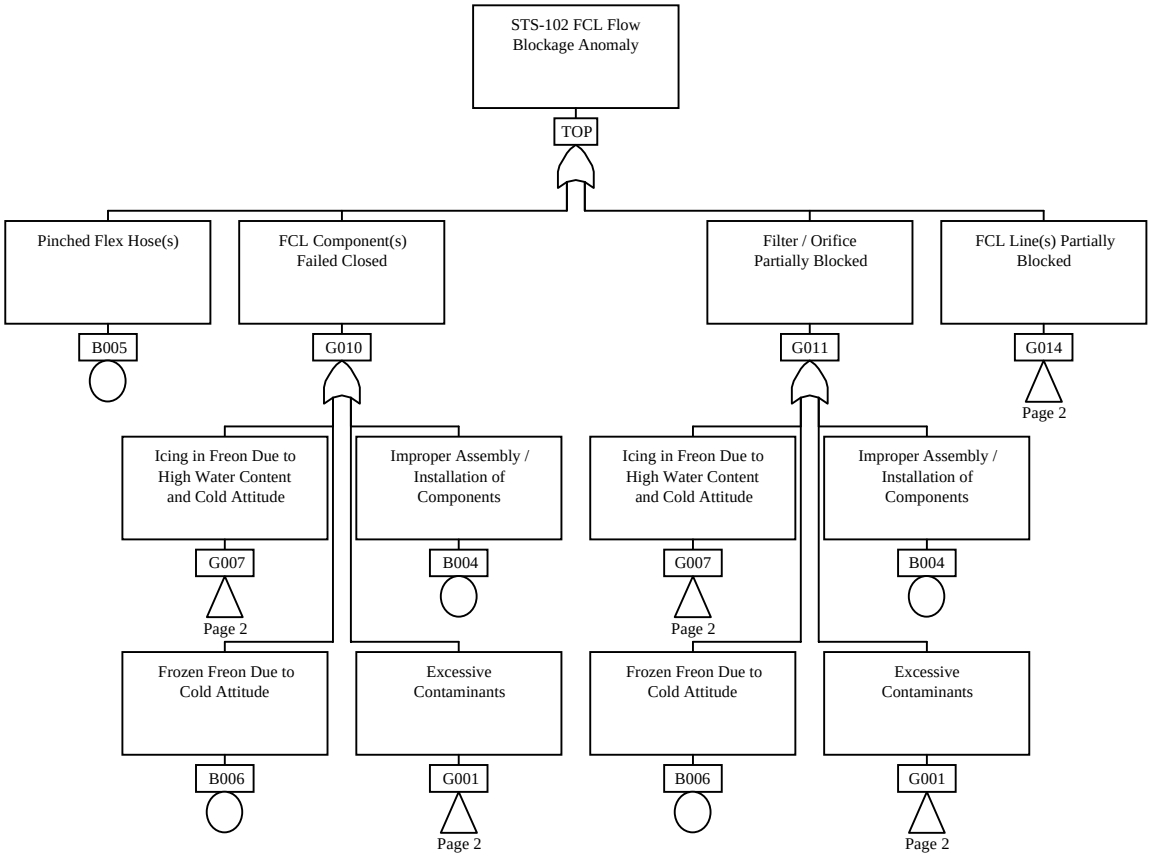
Acceptable for STS-105 Flight:

- STS-105 OMRSD valve and VPI checkout was nominal
  - Troubleshooting did not reveal any anomalies
- Overall valve failure history is very low
  - VPI anomaly is limited to this location on RP03
  - No history of valve function failure
- Subsystem redundancy exists for worst-case failed close vapor isolation valve
  - Parallel flow path
- Flight rules exist for propellant utilization if valve fails closed

STS-102 FCL FLOW BLOCKAGE ANOMALY

Presenter:

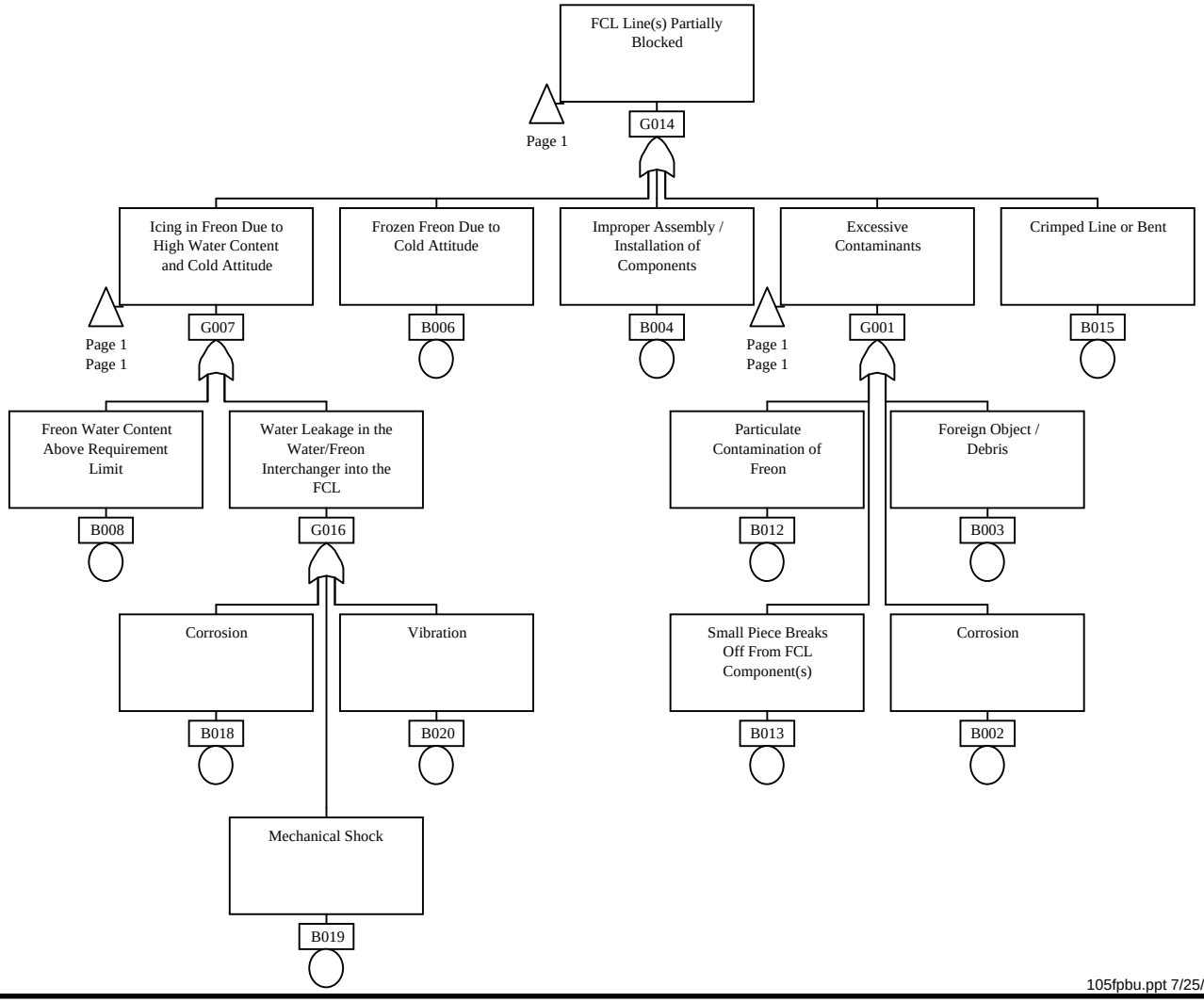
Organization/Date:
Orbiter/08-01-01



STS-102 FCL FLOW BLOCKAGE ANOMALY

Presenter:

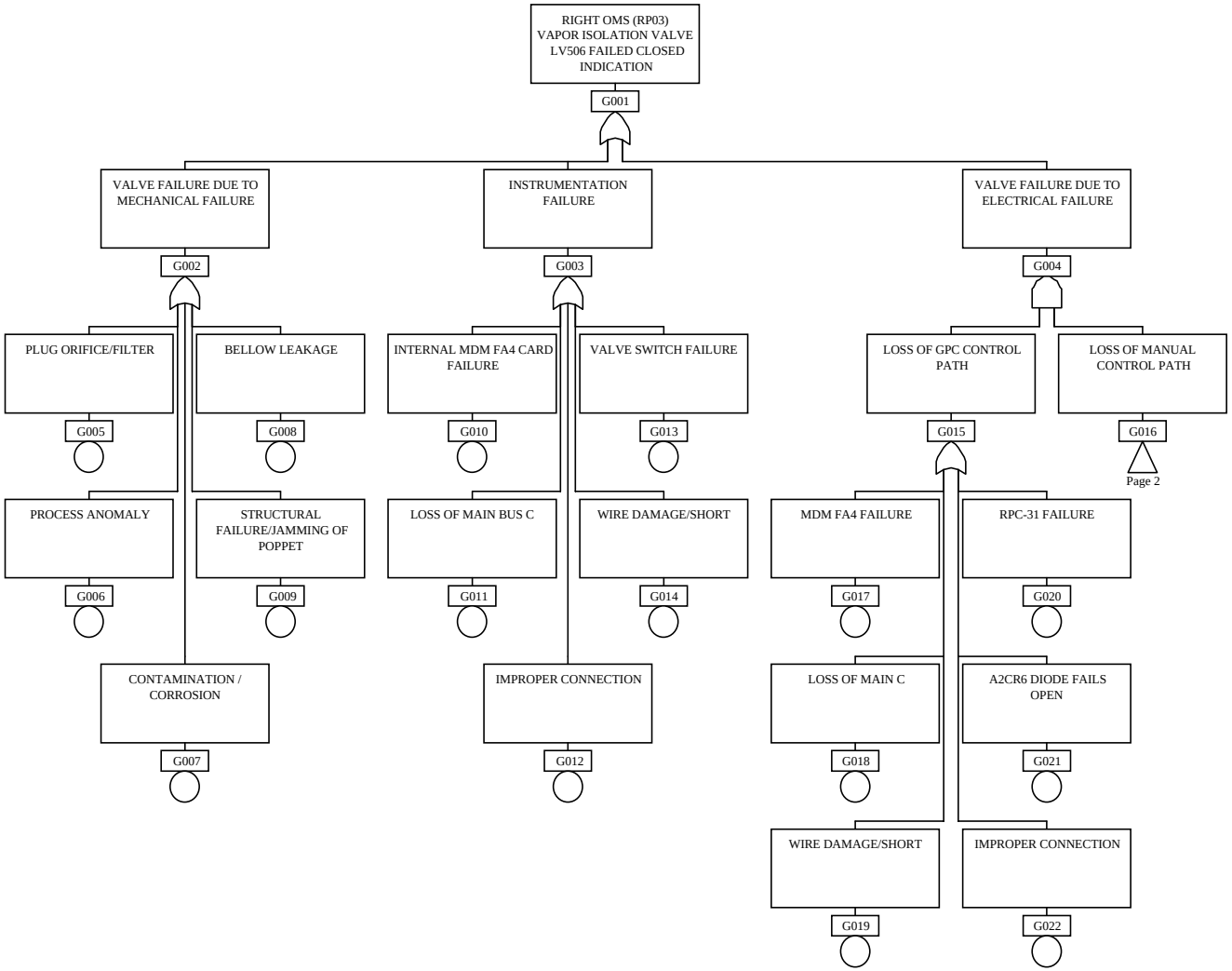
Organization/Date:
Orbiter/08-01-01



OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION

Presenter:

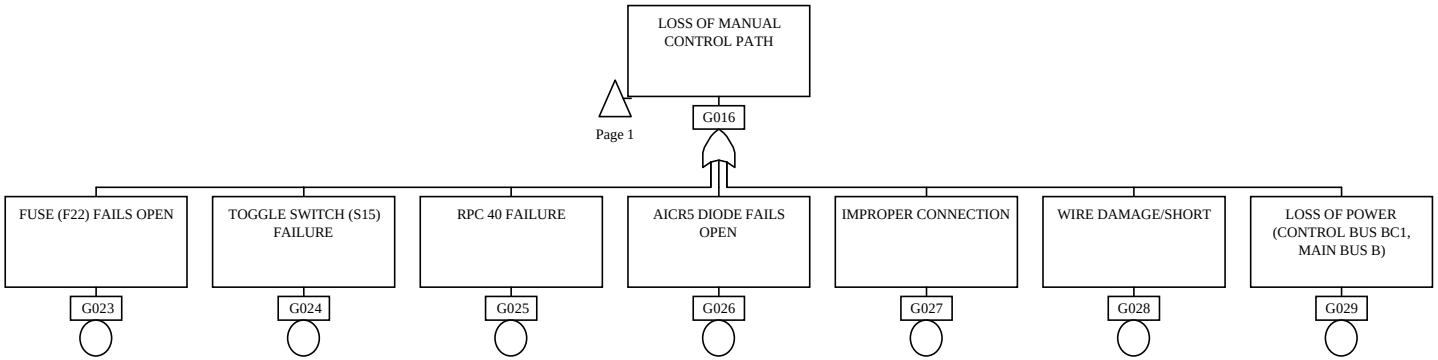
Organization/Date:
Orbiter/08-01-01



OMS VAPOR ISOLATION VALVE FAILED CLOSED INDICATION

Presenter:

Organization/Date:
Orbiter/08-01-01



OMS LV5061 CLOSEOUT MATRIX

Presenter:

Organization/Date:
Orbiter/08-01-01

GATE	DESCRIPTION	ACTIONEE	RESOLVED (Y/N)	COMMENTS/RATIONALE
G005	PLUG ORIFICE/FILTER	B. Werner	Y	This has no effect on the VPI.
G006	PROCESS ANOMALY	B. Werner	Y	If the failure were due to a process anomaly, it probably would have been present when the valve was installed.
G007	CONTAMINATION / CORROSION	B. Werner	N	Contamination or corrosion could possibly affect the VPI limit switch.
G008	BELLOW LEAKAGE	B. Werner	Y	This has no effect on the VPI.
G009	STRUCTURAL FAILURE/JAMMING OF POPPET	B. Werner	Y	This has no effect on the VPI.
G010	INTERNAL MDM FA4 CARD FAILURE	Instrumentation (Fryxell, William T)	Y	BITE test verified correct operation of the MDM.
G011	LOSS OF MAIN BUS C	D. Sovereign	Y	Loss of main C would also lose VPI from Helium Isolation valve B, which works correctly.
G012	IMPROPER CONNECTION	D. Sovereign	Y	An improper connection would not be intermittent.
G013	VALVE SWITCH FAILURE	B. Werner	N	This is a possible cause, however valve numbers 17 and 25 show opposite failures.
G014	WIRE DAMAGE/SHORT	D. Sovereign	N	If the wire were damaged or shorted, valve numbers 17 and 25 would probably not have shown opposite failures.
G017	MDM FA4 FAILURE	Instrumentation (Fryxell, William T)	Y	BITE test verified correct operation of the MDM.
G018	LOSS OF MAIN C	D. Sovereign	Y	Loss of Main C would also lose indication from Helium Isolation valve B, which corks correctly.
G019	WIRE DAMAGE/SHORT	D. Sovereign	N	If the wire were damaged or shorted, valve numbers 17 and 25 would probably not have shown opposite failures.
G020	RPC-31 FAILURE	D. Sovereign	Y	RPC-31 supplies current to the valve under GPC control, and the valve operates correctly.
G021	A2CR6 DIODE FAILS OPEN	D. Sovereign	Y	A2CR6 is an isolation diode for the valve under GPC control, and the valve operates correctly.
G022	IMPROPER CONNECTION	D. Sovereign	Y	An improper connection would not be intermittent.
G023	FUSE (F22) FAILS OPEN	D. Sovereign	Y	F22 also supplies current to the command circuit of Helium Isolation valve B, which works correctly.
G024	TOGGLE SWITCH (S15) FAILURE	D. Sovereign	Y	S15 also commands Helium Isolation valve B, which works correctly.
G025	RPC 40 FAILURE	D. Sovereign	Y	RPC-40 supplies current to the valve under manual control, and the valve works correctly.
G026	AICR5 DIODE FAILS OPEN	D. Sovereign	Y	A1CR5 is an isolation diode in the manual command circuit for the valve, and the valve operates correctly.
G027	IMPROPER CONNECTION	D. Sovereign	Y	An improper connection would not be intermittent.
G028	WIRE DAMAGE/SHORT	D. Sovereign	N	If the wire were damaged or shorted, valve numbers 17 and 25 would probably not have shown opposite failures.
G029	LOSS OF POWER (CONTROL BUS BC1, MAIN BUS B)	D. Sovereign	Y	Control Bus BC1 also supplies command current to Helium Isolation valve B, which works correctly.

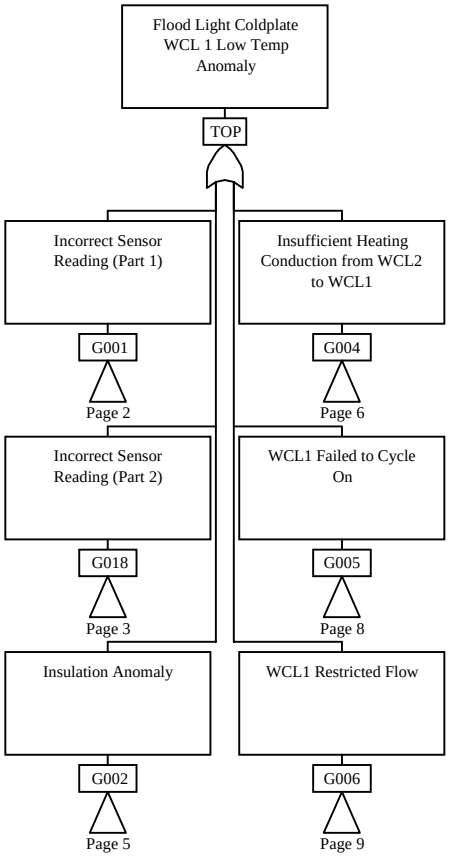
	Presenter:
	Organization/Date: Orbiter/08-01-01

STS-104
IN-FLIGHT ANOMALIES
BACKUP

STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

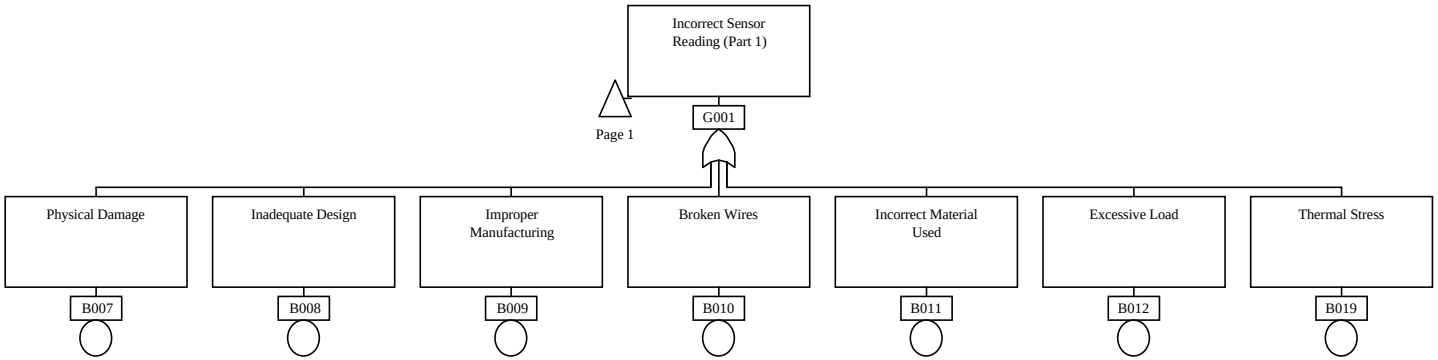
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

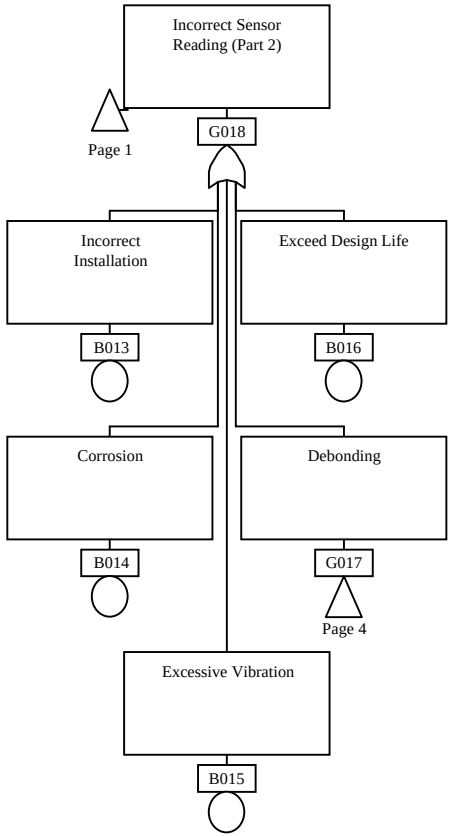
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

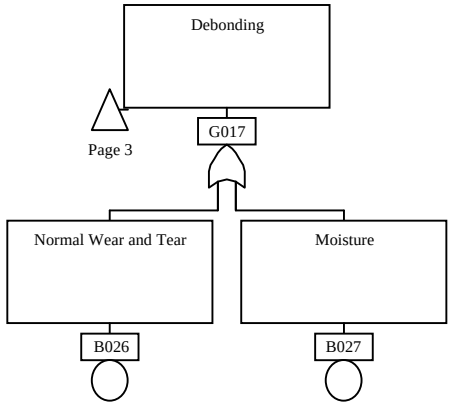
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

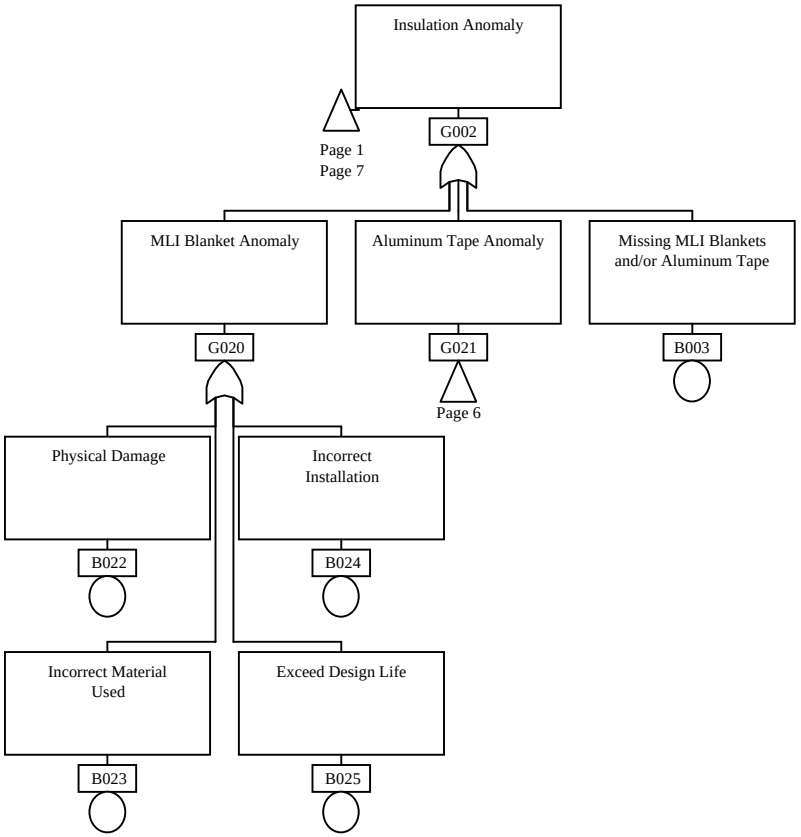
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

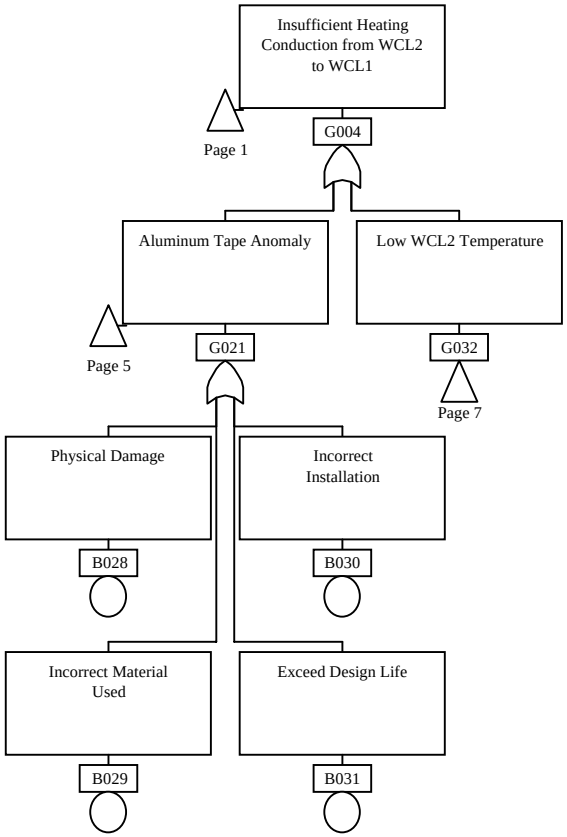
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

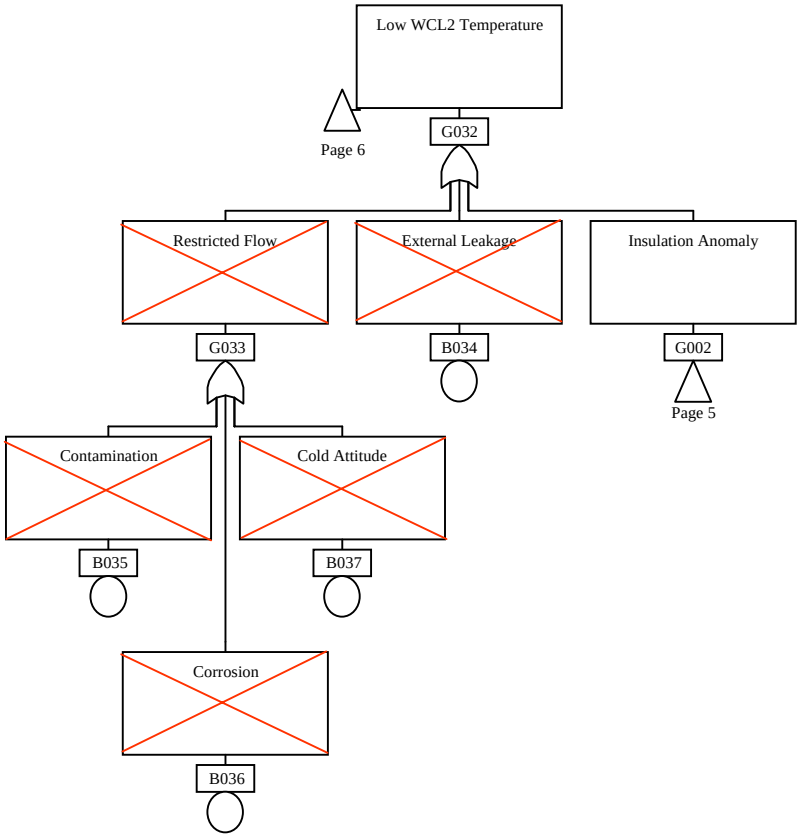
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

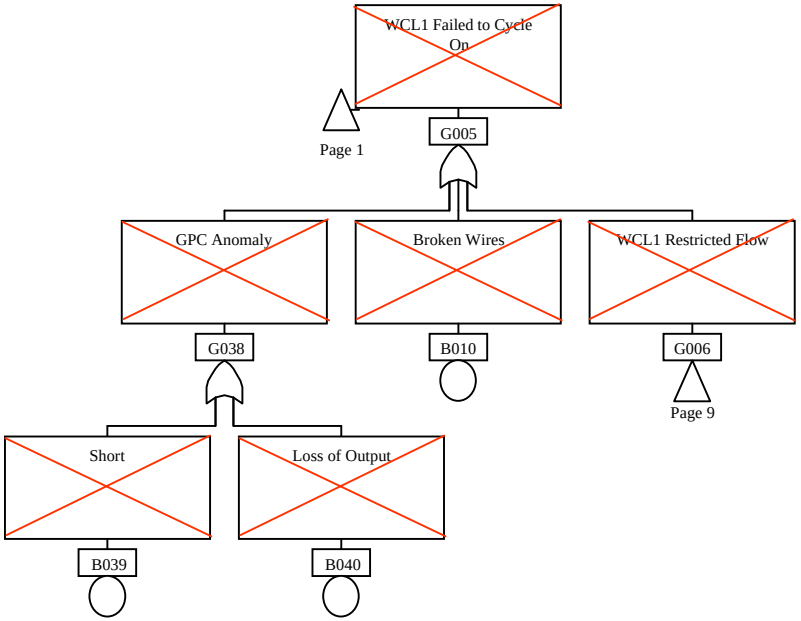
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

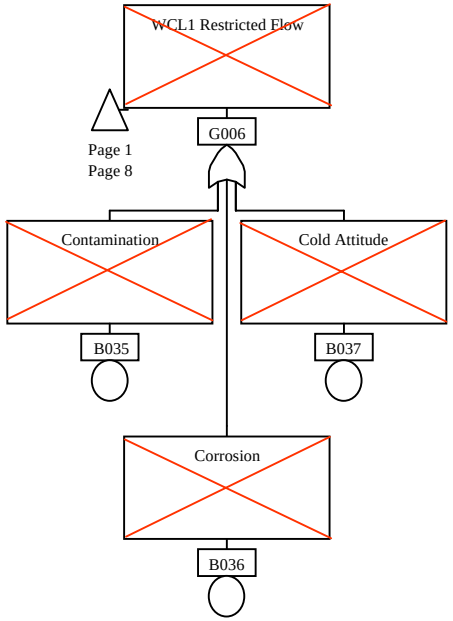
Organization/Date:
Orbiter/08-01-01



STS-104 FLOOD LIGHT COLDPLATE TEMP TRANSIENT

Presenter:

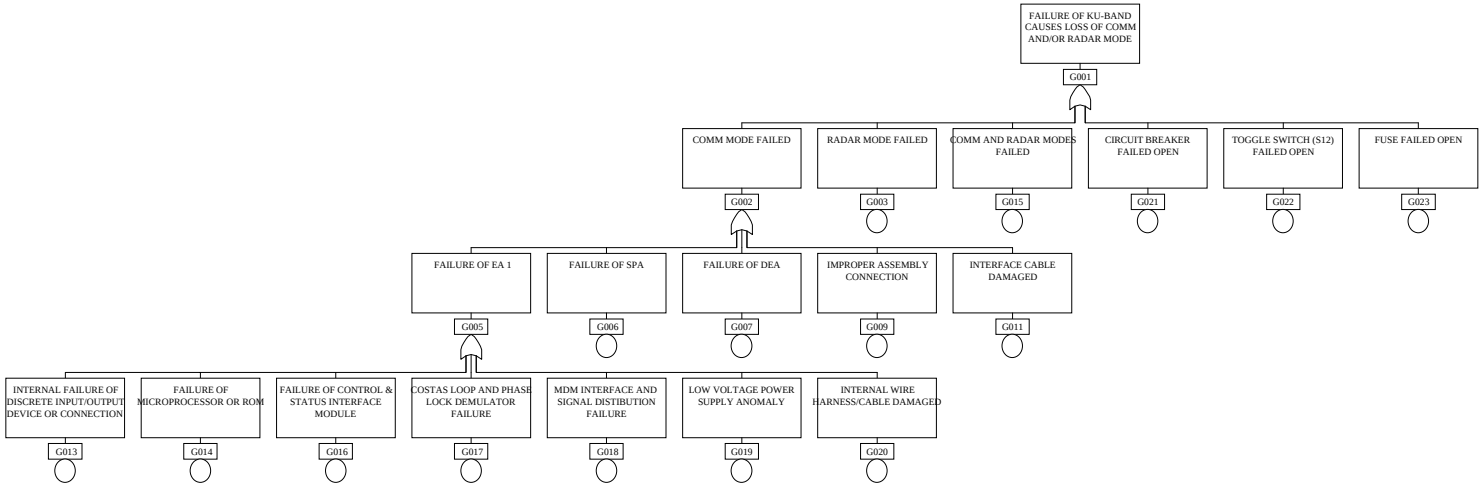
Organization/Date:
Orbiter/08-01-01



STS-104 KU-BAND FAILURE TO ACQUIRE FORWARD LINK COMMUNICATION

Presenter:

Organization/Date:
Orbiter/08-01-01



STS-104 KU-BAND FAILURE TO ACQUIRE FORWARD LINK COMMUNICATION

Presenter:

Organization/Date:
Orbiter/08-01-01

GATE	DESCRIPTION	RESOLVED (Y/N)	ACTIONEE	DUE DATE	COMMENTS/CLOSEOUT RATIONALE
G003	RADAR MODE FAILED				
G006	FAILURE OF SPA				
G007	FAILURE OF DEA				
G009	IMPROPER ASSEMBLY CONNECTION				
G011	INTERFACE CABLE DAMAGED				
G013	INTERNAL FAILURE OF DISCRETE INPUT/OUTPUT DEVICE OR CONNECTION				
G014	FAILURE OF MICRO-PROCESSOR OR ROM				
G015	COMM AND RADAR MODES FAILED				
G016	FAILURE OF CONTROL & STATUS INTERFACE MODULE				
G017	COSTAS LOOP AND PHASE LOCK DEMULATOR FAILURE				
G018	MDM INTERFACE AND SIGNAL DISTIBUTION FAILURE				
G019	LOW VOLTAGE POWER SUPPLY ANOMALY				

STS-104 KU-BAND FAILURE TO ACQUIRE FORWARD LINK COMMUNICATION

Presenter:

Organization/Date:
Orbiter/08-01-01

GATE	DESCRIPTION	RESOLVED (Y/N)	ACTIONEE	DUE DATE	COMMENTS/CLOSEOUT RATIONALE
G020	INTERNAL WIRE HARNESS/CABLE DAMAGED				
G021	CIRCUIT BREAKER FAILED OPEN				
G022	TOGGLE SWITCH (S12) FAILED OPEN				
G023	FUSE FAILED OPEN				

	Presenter:
	Organization/Date: Orbiter/08-01-01

ENGINEERING REQUIREMENTS

BACKUP

ENGINEERING REQUIREMENTS WAIVERS/DEVIATIONS

Presenter:

Organization/Date:
Orbiter/08-01-01

- **The following SODB Vol. V Deviation has been processed for STS-105**
  - Deviation written to document RCC temperature limit violations for STS-105 trajectories as predicted by the Thermal Structural Envelope Program (TSEP) version 3.5.
  - Temperature limit violations are acceptable for flight based upon mission specific stress analysis showing positive margins of safety. All violations are enveloped by previous missions.

Envelope expansion in work will eliminate violations for future flight design

	Presenter:
	Organization/Date: Orbiter/08-01-01

CONFIGURATION CHANGES AND CERTIFICATION BACKUP

CONFIGURATION CHANGES AND CERTIFICATION STATUS

Presenter:

Organization/Date:
Orbiter/08-01-01

OV-103 STS-105 Modifications and Certification

Current Mission Requirements

MCR/Modification	Certification Method			Certification Approval Request No.	Approval Date	Remarks
	Test	Analysis	Similarity			
MCR 17177 Aft Ballast Shim Modification				N/A		• Reduces shim size • Shim interfered with shim ballast box on OV-105 (PR EOTF)
MCR 18755 FWD & AFT Winch Pip Pin Mod		X		03-24-610005-OFT (B) 03-24-634480G	05/29/01A 06/29/01A	
MCR 19541 RSK Recumbent MS Cushions Mission Kit MVO865A MV0226A			X X X X	25-39129802-301A 01-25-39129802-301A 25-39126815-301A 04-25-39126815-301E	07/26/01A	• New Cushion Attaches to Modified Mission Specialist Cushion (Height Adjustability); Adding 4 pieces of Velcro to Attach New Cushion. Crew Request
MCR 18755 External Airlock Bag-strap Velcro Removal Mission Kit MVO828A		X	X X	25-669-002025-001C 04-25-669-002025-001C	06/25/01A	• During use with soft good payloads, velcro straps would be cinched and pulled through no longer able to use. This strap acts as a belt loop. Determined to remove velcro loop and let strap float freely.

CONFIGURATION CHANGES AND CERTIFICATION STATUS

Presenter:

Organization/Date:
Orbiter/08-01-01

OV-103 STS-105 Modifications and Certification

Current Mission Requirements

MCR/Modification	Certification Method			Certification Approval Request No.	Approval Date	Remarks
	Test	Analysis	Similarity			
MCR 18755 LW Locker Latch MOD Mission Kit MVO849A			X	25-660800-001B 02-25-660800-001B	06/29/01A	• Over Rotation With Latches
MCR 19376 Milson Fastener Mod Mission Kit MVO602A		X		02-25-000907-001A 16-25-661602-001O 07-25-661612-001F 09-25-660511-001H	6/25/01A 6/25/01A 6/25/01A 6/25/01A	• MA9N Bags/Frame • Mid-deck Modular Stow Kit • Panels-Avionics Bay C/O • Thermal Debris Panels • Worked Concurrently With L/W Locker-Requires Recycle of Lockers & Panels

CONFIGURATION CHANGES AND CERTIFICATION STATUS

Presenter:

Organization/Date:
Orbiter/08-01-01

OV-103 STS-105 Modifications and Certification

Current Mission Requirements

MCR/Modification	Certification Method			Certification Approval Request No.	Approval Date	Remarks
	Test	Analysis	Similarity			
MCR 19535 **Heat Shrink-fit Tubing For Pyro Harnesses** **Mission Kit MVO401A**				**N/A ***	**N/A**	• One of the findings from the fleet wiring investigation was that harnesses routed to various pyrotechnic devices in the orbiter are frequently handled and subject to excessive flexing, resulting in possible damage. • Corrective action identified to preclude damage is to add heat shrink tubing - • Along the harness length to limit flexing and to protect the harness from damage • An additional, localized overwrap sleeve, at the connector strain relief tang, to minimize local stress concentration • Harness inspection will be performed prior to application of the heat shrink tubing • During this processing flow, the Aft Fuselage Orbiter/ET pyro harnesses were modified

CONFIGURATION CHANGES AND CERTIFICATION STATUS

Presenter:

Organization/Date:
Orbiter/08-01-01

OV-103 STS-105 Modifications and Certification

Current Mission Requirements

MCR/Modification	Certification Method			Certification Approval Request No.	Approval Date	Remarks
	Test	Analysis	Similarity			
MCR 19605 ODS Centerline Camera Harness Modification **Mission Kit MVO828A**				**N/A ***	**N/A**	• STS-106 primary ODS centerline camera harness failure was found to be caused by a wire failure near one of three splice locations • The failure was attributed to the fact that the harness is flexed during handling, stowage and on-orbit installation, which causes stress at the splice locations • The failure was also partly attributed to splice over-crimp • Splices utilized to reduce voltage drop • Harness modification relocates the three harness splices to be contained within the backshells, protected from flexure induced damage

	Presenter:
	Organization/Date: Orbiter/08-01-01

MISSION KITS
BACKUP

ORBITER PROVIDED MISSION KITS	Presenter:
	Organization/Date: Orbiter/08-01-01

Orbiter Provided Mission Kit Changes:

- MV0401A Heat Shrink-fit Tubing For Pyro Harnesses
- MV0573A Aft Ballast Fuselage Shim Installation
- MV0602A Milson Fastener Pip Pin Modification
- MV0865A RSK Recumbent Mission Specialist Seat Mod
- MV0226A Headrest Cushion, LW M/S Seat
- MV0828A ODS Centerline Camera Harness Redesign
- MV0828A External Airlock Bag-Strap Velcro Removal
- MV0849A Light Weight Locker Latch Modification

	Presenter:
	Organization/Date: Orbiter/08-01-01

OMS/RCS MR SUMMARY BACKUP

OMS/RCS MR SUMMARY

Presenter:

Organization/Date: Orbiter/08-01-01

PR Number	Part Name	Part Number	Serial	Date

FRC3-30-0692 RCS Engine MC467-0028-5122 401 6/01/01

F3F thruster identified with two scratches in nozzle coating near exit. Mold impressions taken indicating a coating scratch a 5 o-clock position 1½” from exit measuring .250”x.025”x.001”deep and a second at 4 o-clock position 3½” from exit measuring .055”x.025”x.001”deep. Both conditions accepted due to their location in thruster and minimal depth. Neither condition will promote rapid oxidation of columbium due to insufficient oxygen on orbit and insufficient heating during ascent or descent. Thruster inspections will continue to be performed every flight as required.

FRC3-30-0693 RCS Engine MC467-0028-5116 304 6/01/01

Chip/meteorite impact in coating in the combustion chamber of F1D. Originally detected on STS-95 and estimated to be 0.250” diameter. The current mold impression reveals actual size to be .225”x.220”x.001”deep. Evaluation of the borescope video shows the diffusion zone to be intact additionally, since the current depth is 0.001" the diffusion layer is still intact. With the chip located in the chamber close to the injector face, the temperatures are relatively low and much cooler than the throat area. Conditions have been documented in the thruster damage log and thruster inspections will continue to be performed every flight as required.

OMS/RCS MR SUMMARY

Presenter:

Organization/Date:
Orbiter/08-01-01

PR Number	Part Name	Part Number	Serial	Date
LP01-33-0987	**RCS Engine**	**MC467-0029-7200**	**466**	**06/01/01**

L5L thruster identified with 2 coating chips in the throat crest. 4 o-clock .020”x.025”, 8 o-clock .110”x.090”. Evaluation of the borescope video shows the diffusion zone to be intact. Temperature considerations during ascent and entry indicate maximum temperatures not to exceed 1200°F with temperatures generated by thruster firing to be within 1600°F. These service conditions produce thermal environments that are less than 2200°F which, is a limit to protect against rapid oxidation of the C103 columbium. Conditions have been documented in the thruster damage log and thruster inspections will continue to be performed every flight as required.

OMS/RCS MR SUMMARY

Presenter:

Organization/Date:
Orbiter/08-01-01

PR Number	Part Name	Part Number	Serial	Date
LP01-33-0993	**OMS Engine**	**MC621-0009-0003**	**107**	**6/11/01**

LOMS Engine identified with the following concerns 1) Engine flange and nozzle flange have no acceptance/inspection criteria, 2) flange identified with minor scuff marks at 12, 5, and 8 o-clock positions and a nick with raised metal at the 3 o-clock position. Item 1: Criteria continues to be developed and formalized as priorities allow. Item 2: Observed marks have a measured depth of ranging from .001” to .0018” with a smooth contour exhibiting no sharp edges. The marks are located within the sealing surface but do not extend across it. These conditions are accepted due to an effective seal of the GRAFOIL gasket not being compromised. The gasket itself is .030” thick and during installation will typically compress .004” to .006” effectively sealing the blemishes detected. Subsequent leak check of the seal was accomplished with no detectable leakage. The nick reported at the 3 o-clock position is on the outside circumference/edge of the flange and is does not interfere with the mating surface or heat shied installation. This condition is cosmetic with no functional impact.

OMS/RCS MR SUMMARY

Presenter:

Organization/Date: Orbiter/08-01-01

PR Number	Part Name	Part Number	Serial	Date

LP01-A0070 OMS Engine MC621-0009-0003 107 6/11/01

Deferred PR against LOMS Engine for corrosion in the combustion chamber/nozzle. Pitting documented in the chamber in July 2000 was assessed this flow for growth/degradation. No pitting growth or degradation was detected. MR processed for restricted use.

RP03-31-1093 RCS Engine MC467-0028-5001 120 6/01/01

R1U thruster has a chip in the throat crest with possible degradation. Originally detected on STS-28R and estimated to be 0.075”x0.036”, the current mold impression data reveals two chips: .058”x.037”x.004”deep and .017”x.012”x.004”deep. Evaluation of the borescope video shows the diffusion zone to be intact additionally. Temperature considerations during ascent and entry indicate maximum temperatures not to exceed 1200°F. These service conditions produce thermal environments that are less than 2200°F which, is a limit to protect against rapid oxidation of the C103 columbium. On orbit steady state firing could produce temperatures as high as 2350°F however, typical ascent/descent operation would limit temperatures to less than 2200°F. Neither condition will promote rapid oxidation of columbium due to insufficient oxygen on orbit and insufficient heating during ascent or descent. Conditions have been documented in the thruster damage log and thruster inspections will continue to be performed every flight as required.

OMS/RCS MR SUMMARY

Presenter:

Organization/Date:
Orbiter/08-01-01

PR Number	Part Name	Part Number	Serial	Date
RP03-A0075	**OMS Engine**	**MC621-0009-4003**	**106**	**06/14/01**

Deferred PR against LOMS Engine for corrosion in the combustion chamber/nozzle. Pitting documented in the chamber in July 2000 was assessed this flow for growth/degradation. No pitting growth or degradation was detected. MR processed for restricted use.

New item added to PR for meteorite strike on Nozzle extension (p/n: MC621-0009-0405 s/n: 119) located 17” forward of nozzle exit. Coating loss to the inside of the nozzle extension measures .091”x.092”x.003” deep, the outside damage includes coating loss of .095”x.088”x.003”deep with a localized impression of .023”x.037”x.007”deep. X-ray inspection of the extension verified no cracking occurred in the columbium. Assessment of the defect regarding the thermal environment indicates a maximum temperature to be experienced during engine firing and would not exceed 1300°F, which remains below temperatures where columbium oxidation would be a concern. MR processed for restricted use.