



## **STS-107 Flight Readiness Review**

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# **Space Station and Payloads Processing STS-107**

## **SPACEHAB-Research Double Module FREESTAR**

**Jack Keifenheim  
STS-107 KSC Mission Manager  
January 9, 2003**



# Agenda

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- Hardware Images To Be Briefed
  - Milestone History To Be Briefed
  - Open Work To Be Briefed
  - Late Stowage Activities To Be Briefed
  - Middeck Experiment Requirements To Be Briefed
  - Launch Delay Requirements To Be Briefed
  - Launch Commit Criteria To Be Briefed
  - Engineering Status To Be Briefed
    - Processing Status
    - Requirements
    - PRACA
  - Readiness Certification To Be Briefed
  - Acronyms In Back-Up
  - Master Milestone Schedule In Back-Up
  - LCC Charts In Back-UP
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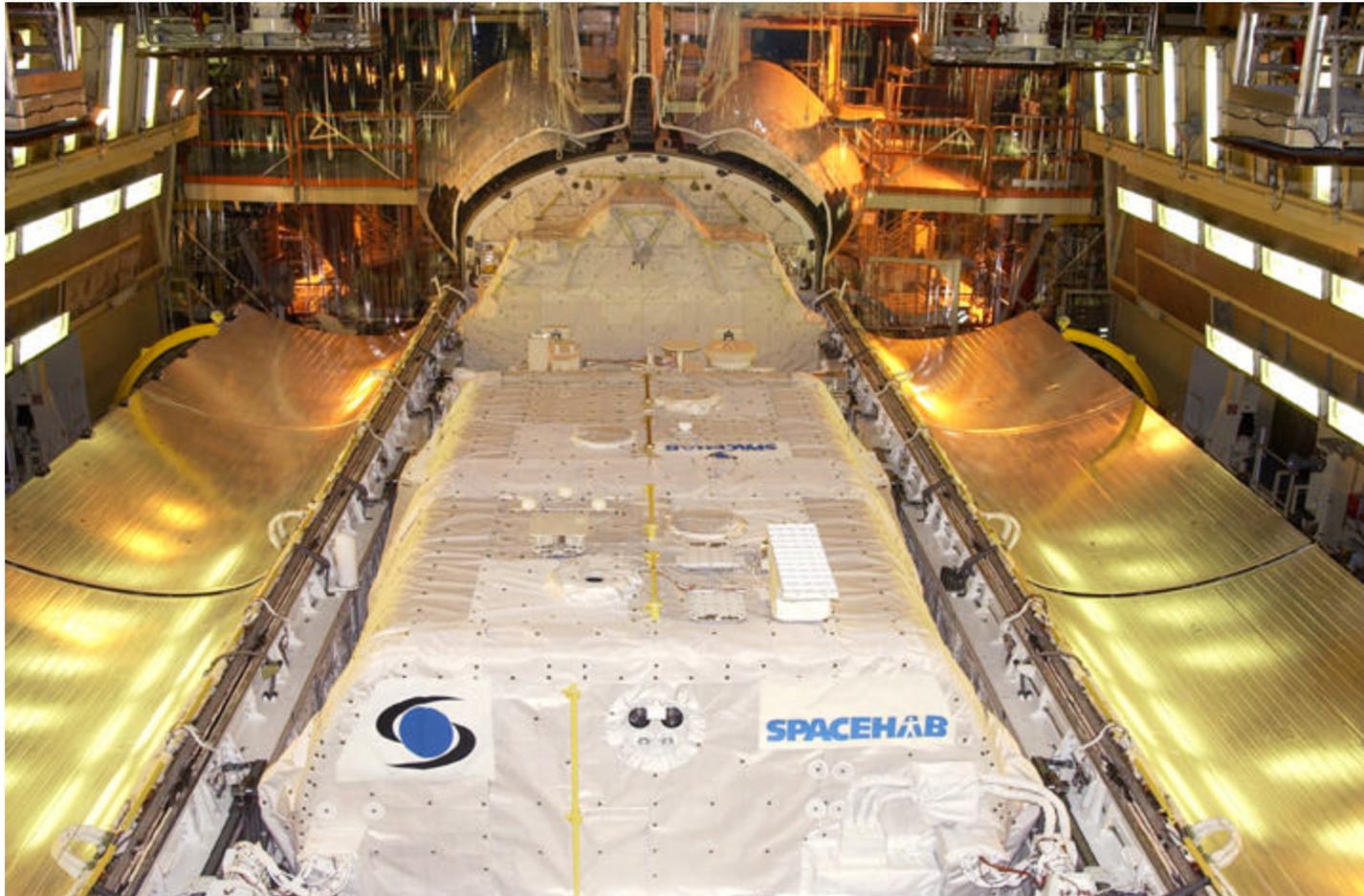


# SPACEHAB-RDM and Tunnel



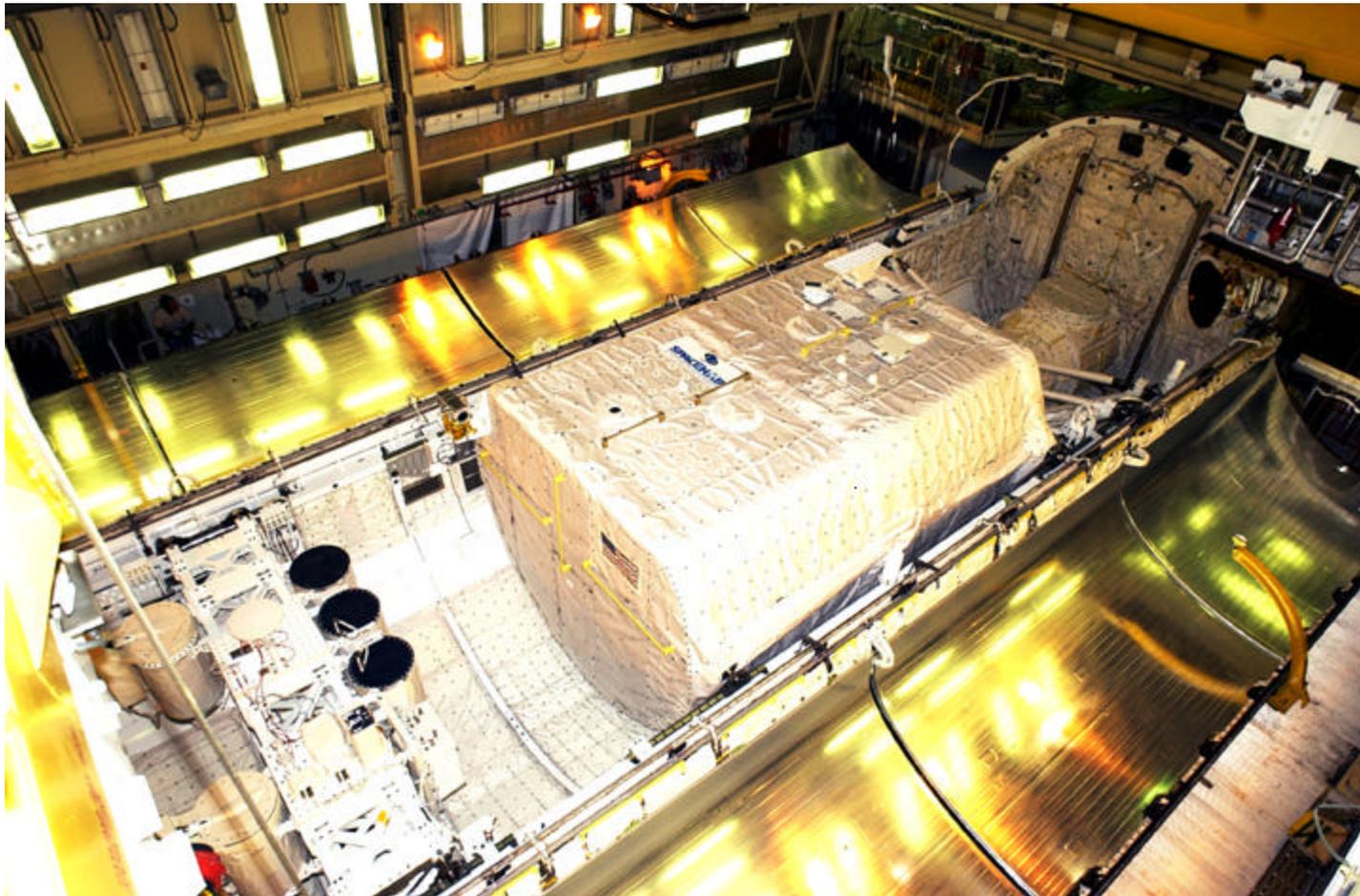


# SPACEHAB and EDO Pallet





# FREESTAR and SPACEHAB-RDM





# Milestone History

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SPACEHAB-RDM Tunnel New Hardware O/D	1/4
Tunnel Reconfiguration	1/17- 5/10
FREESTAR MPPF O/D	3/18
SPACEHAB/FREESTAR/Tunnel Installation into Orbiter	5/23
FREESTAR IVT	5/24
SPACEHAB-RDM IVT	6/3-6/10
Orbiter PLBD Closure for Flight	6/14
STS Orbiter LH2 Flowliner Crack Investigation	6/20-8/5
SPACEHAB-RDM / Experiments Health Check Testing	7/24, 10/29-30 11/11
SPACEHAB Experiments Health Check (drag on power)	8/28 VAB, 9/25
PLBD Open (Orb. Camera Rmvl for STS-112)	9/17
PLBD Closed for Flight	10/31
SPACEHAB-RDM Stow and Closeouts	11/12
SPACEHAB-RDM LCC CITE Simulation (SSPF)	12/5
S0044 LCC Simulation	12/6
OV-102 Rollout with SPACEHAB-RDM and FREESTAR	12/9
FREESTAR MEIDEX Video Test	12/12
SPACEHAB-RDM Early MVAK Stow	1/6



# Open Work

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## Pad A

SPACEHAB Late MVAK Stow / Internal Closeouts	1/14-15
Middeck Late Stowage and IVTs	1/15
Launch	1/16

FREESTAR has no open Pad work



# Late Stow Activities

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## Late MVAK Activities

- MVAK Pre-operation (January 6) (Complete)
- Reconfigure MVAK / Open D Hatch (January 13)
- SPACEHAB-RDM Activation (L-51 hours) (January 14)
- SPACEHAB-RDM Late Stow and Closeouts (to L-31 hours)
- Close D Hatch (to L-29:30)
- Remove MVAK (following tunnel/airlock C/O, to L-24)
  - 20 hours of activity from SPACEHAB activation to D Hatch closure
  - MVAK training in March and October 7 & 8
  - Early MVAK Stow Jan. 6 provided experience
  - MVAK equipment thoroughly inspected and certified

## Late Middeck Stowage

- FCE Stowage (following com. act.) starts at L-22:30
- Middeck Experiment Stowage from L-19 to L-16
  - 14 lockers total
  - 4 powered lockers requiring IVTs
- Stowage contingency plans and security arrangements are developed



# Middeck Experiment Requirements

Middeck	Installation	IVT	Ascent Power	Launch Delay	Destow
CEBAS	< L-17 Hrs	Yes	Yes	48 Hrs	Runway
CEBAS Stowage	Nominal	No	No	None	Runway
CMPCG	< L-24 Hrs	Yes	Yes	48 Hrs	Runway
OSTEO	< L-19 Hrs	Yes	Yes	24 Hrs	Runway
Biopack Facility Contents	< L-17 Hrs	No	No	24 Hrs	Runway
Biopack Glovebox Tray	< L-24 Hrs	No	No	48 Hrs	Runway
Biopack PTCUs, 5 deg C (2)	< L-17 Hrs	No	No	24 Hrs	Runway
Biopack PTCUs, -10 deg C (2)	< L-17 Hrs	No	No	48 Hrs	Runway
HLS Phab-4	< L-24 Hrs	No	No	48 Hrs	Runway
HLS Stowage	< L-24 Hrs	No	No	48 Hrs	Runway
BDS-05 Stowage	< L-24 Hrs	No	No	48 Hrs	Runway
BRIC	< L-17.5 Hrs	Yes	Yes	24 Hrs	Runway
ZCG Autoclaves	< L-22 Hrs	No	No	48 Hrs	Runway
SH FDF	< L-48 Hrs	No	No	None	Runway
Jettison Stowage Bag	Nominal	No	No	None	Runway



# Launch Delays

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## SPACEHAB-RDM

MVAK access to the SPACEHAB-RDM is required for experiment refurbishment, if the launch is delayed for 48 hours or greater from the initial T-0.

A 96 hour scrub turnaround is required for this effort

- 18.5 hours (launch window, pad safing, FCE destow, MVAK set-up, open D hatch)
- 13 hours of SPACEHAB destow
- 18 hours of experiment refurbishment to L-46.5 hours
- 16 hours of SPACEHAB restow to L-30.5
- 6.5 hours (hatch closing, MVAK removal, A/L closeout) to L-24
- SPACEHAB remains powered through 96 hour scrub
- For scrub durations longer than 96 hours, SPACEHAB would power-down

## FREESTAR

No launch delay requirements

## MIDDECKS

Experiment refurbishment is required for 24 and 48 hour delays. (See Middeck Requirements)

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# Launch Commit Criteria

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## Launch Commit Criteria

11 Mission Success LCCs

3 Payload safety LCCs

A full CITE simulation was performed on December 5 to exercise the launch team in the protocol and flow of the LCCs

- NTD, SPE, SPACEHAB engineering, PLM and mission management attended

The payload launch team participated in S0044 on December 6 which involved multiple payload problems and simulations

- This provided further simulation and exercise of the payload launch team in an integrated environment

The prime and backup payload launch teams have simulated the LCCs and protocol and are ready to support launch activities



# Engineering Status

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## Processing Status

### **SPACEHAB-RDM Experiment Health Checks**

All SPACEHAB-DM powered up health checks were performed without anomalies or issues

### **MEIDEX Video Camera Retest**

Post Freestar IVT evaluation of the video tapes from the MEIDEX experiment revealed color banding in the images

OMRS P488FJ.020 – MEIDEX Video signal was successfully bought off in the Freestar IVT

Subsequent evaluation by JSC DTV experts determined that there were anomalies in the video tape recorded by the MEIDEX cameras

GSFC initiated a CR to the PIP to perform further video testing at the pad and TPS VT-STS-107-PLD-T106 was written to perform this testing on December 12.

A post test evaluation of the video tapes recorded during this testing will be used to determine any on-orbit configuration required for optimum video performance

The results of this test showed no color banding or problems with the recorded video

### **Summary**

All required work has been completed with no outstanding issues

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# Engineering Status

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## Requirements

### OMRS

No open RCNs

All remaining open requirements are incorporated into appropriate scheduled procedures.

### Exception/Waivers

EKP10288 – Biopack Data Verification – OMRS P1426FL.100

Exception to allow for Biopack data cable disconnection due to damage

This exception has been approved and incorporated

The Biopack cable has been repaired and reinstalled

A protective cover has been developed to preclude further damage



# Engineering Status

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## PRACA

**VT-ST5-107-PLD-P010** – SPACEHAB FORWARD LINK NOT RECEIVED AT SPACEHAB-RDM.

**DESCRIPTION** – During the interface verification of the Orbiter KUSP Channel 2 interfaces with the SPACEHAB-RDM, uplink commands were not being received at the SPACEHAB EDSMU.

**ACTIONS TAKEN** – Troubleshooting discovered that the clock signal from the Orbiter KUSP to the forward link had a reversed polarity. SPACEHAB engineering modified the J13 connector on the harness to the EDSMU to swap the pins for the clock signal. Retest was successful.

**ACTIONS PLANNED** – USA engineering and SPACEHAB engineering have an action to review the As-Build drawings of the cables from the KUSP to the SPACEHAB to determine where the reversed polarity of the clock signal occurred. SPACEHAB is investigating timing signal inputs and outputs on the EDSMU.

**RISK ASSESSMENT** – No constraint to launch. Modifications of the SPACEHAB harness assured interface verification for the STS-107 mission.

**SUMMARY** – Pending completion of SPACEHAB testing at ESTL, if the problem is not isolated to SPACEHAB systems, the PR will be deferred. Post mission testing will be performed at the SIP to determine the location of the swapped signal.



# Engineering Status

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## PRACA

### Lost & Found PR

VT-STS-107-PLD-P009 – Lost SPACEHAB FOD Bag

Detected during powered up experiment operations

The SPACEHAB customer has performed an extensive investigation and verified that the FOD bag is most probably not in the SPACEHAB module and this was a procedural error in the ingress/egress logs

Closure of the SPACEHAB non-conformance is “No constraint to flight”

No open IPRs/PRs effecting forward work (**VT-STS-107-PLD-P010 deferred**)

No Unexplained Anomalies

No Significant Crew Squawks

No LOLI Issues



# Readiness Statement

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Pending completion of the planned forward work the KSC ISS / Payloads Processing Directorate is ready to proceed with the launch of STS-107.

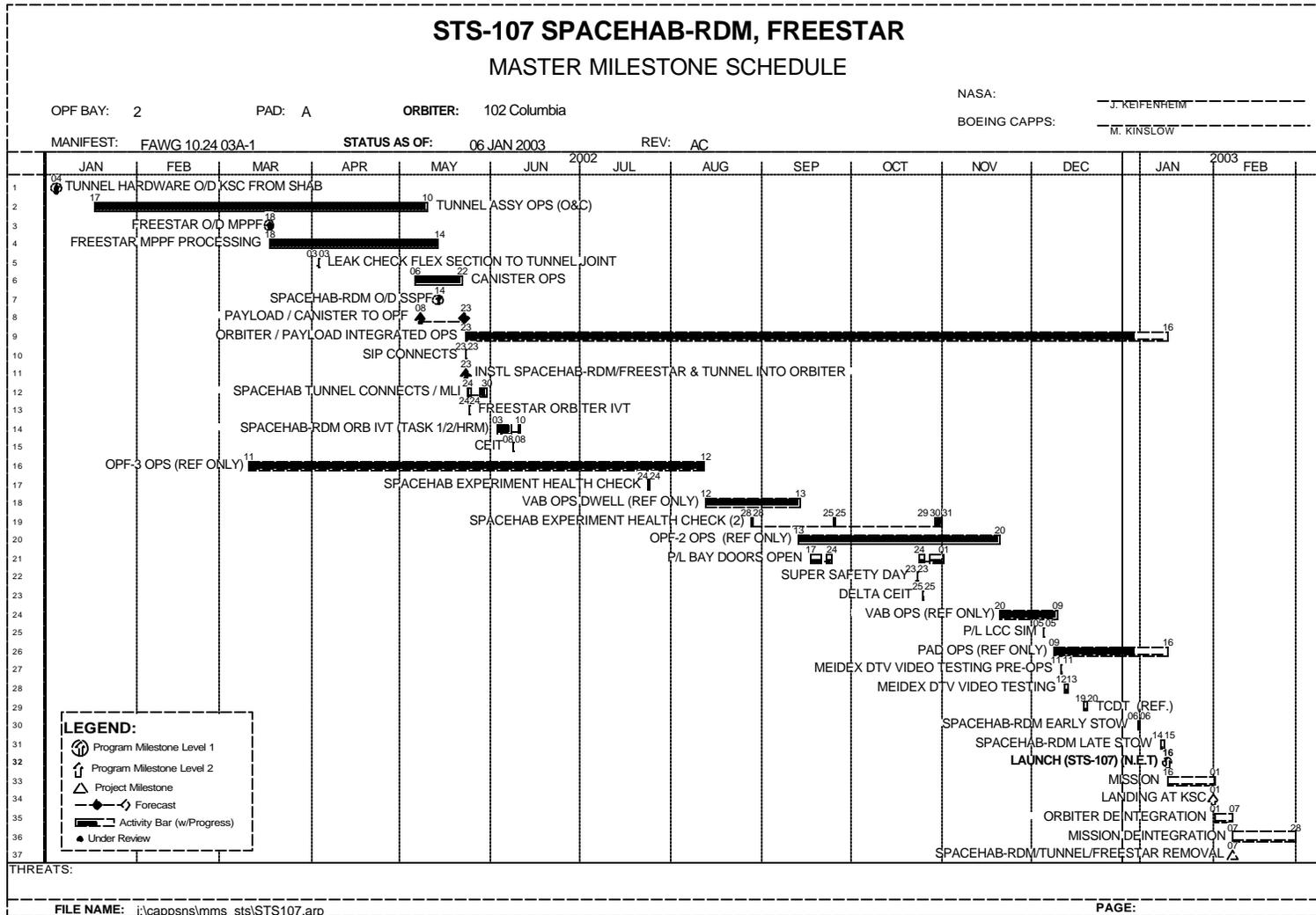


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# BACK-UP CHARTS



# Master Milestone Schedule





# Acronyms

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BDS	Bioreactor Development System
BRIC	Biological Research in Canisters
CEBAS	Closed Equilibrated Biological Aquatic System
CMPCG	Commercial Macromolecular and Protein Crystal Growth
HLS	Human Life Sciences
IVT	Interface Verification Test
MPFE	Microbial Physiological Flight Experiment
MVAK	Module Vertical Access Kit
OSTEO	Osteoporosis Experiment in Orbit
PTCU	Passive Thermal Containment Unit
RMD	Research Double Module
SH FDF	SPACEHAB Flight Data File
FREESTAR	Fast Reaction Experiment Enabling Science Technology Applications and research
ZCG	Zeolite Crystal Growth



# Launch Commit Criteria

SSID Number	RDM Title	Mission Success/Safety	LCC Timeframe	Monitored By
RDM-01	SPACEHAB HFA FAN ANOMALY	Safety	T-6 hrs to T-31 sec	NASA/KSC
RDM-02	SPACEHAB EMERGENCY BUS VOLTAGE ANOMALY	Safety	T-6 hrs to T-31 sec	NASA/KSC
RDM-03	SPACEHAB SMOKE/FIRE ANOMALY	Safety	T-6 hrs to T-31 sec	NASA/KSC
RDM-04	SPACEHAB DMU INTERFACE/POWER FAILURE	Mission Success	T-6 hrs to T-31 sec	Customer from NASA/KSC console
RDM-05	PAYLOAD AFT MAIN B CRITICAL POWER ANOMALY	Mission Success	T-6 hrs to T-9 min	Customer from NASA/KSC console
RDM-06	SPACEHAB MAIN POWER ANOMALY	Mission Success	T-6 hrs to T-31 sec	Customer from NASA/KSC console
RDM-08	SPACEHAB SUBSYSTEM WATER LOOP FLOW RATE ANOMALY	Mission Success	T-6 hrs to T-31 sec	Customer from NASA/KSC console
RDM-09	SPACEHAB WATER PUMP ACCUMULATOR QUANTITY (high/low) ANOMALY	Mission Success	T-6 hrs to T-5 min	Customer from NASA/KSC console
RDM-10	SPACEHAB WATER PUMP INLET PRESSURE (high/low) ANOMALY	Mission Success	T-6 hrs to T-5 min	Customer from NASA/KSC console
RDM-11	SPACEHAB WATER PUMP OUTLET PRESSURE (high/low) ANOMALY	Mission Success	T-6 hrs to T-5 min	Customer from NASA/KSC console
RDM-12	CEWPP ACCUMULATOR QUANTITY ANOMALY	Mission Success	T-6 hrs to T-9 min	Customer from NASA/KSC console
RDM-13	CEWPP INLET PRESSURE ANOMALY	Mission Success	T-6 hrs to T-9 min	Customer from NASA/KSC console
RDM-14	CEWPP OUTLET PRESSURE ANOMALY	Mission Success	T-6 hrs to T-9 min	Customer from NASA/KSC console
RDM-15	SPACEHAB HFA FAN COMMAND ANOMALY	Mission Success	T-6 hrs to T-9 min	Customer from NASA/KSC console