

MISSION OPERATIONS DIRECTORATE FLIGHT DIRECTOR OFFICE



STS-108/ISS-UF-1 Mission Summary Flight Readiness Review

DA8/Sally P. Davis

November 15, 2001

Shuttle Overview

- Propulsive Consumables Summary
 - OMS Load/Margin 25064/100
 - ARCS Load/Margin 4970/100
 - FRCS Load/Margin 2446/730
 - Mean rendezvous at 205 n.mi., no extra mated attitude hold, no reboost, no flyaround, 2-2-2 Deorbit protection, and a 10-second Simplex burn protected
 - OMS assist dial-down buys back 1 hour of config 3 reboost and 2 hours of config 4 reboost
- Non-Propulsive Consumables Summary
 - Cryo H2 (# tanks/Margin/Launch hold) 5/40.7/118.3
 - Cryo O2 (# tanks/Margin/Launch hold) 5/196.4/196.2
 - N2 (#tanks/Margin) 6/6.6
- LiOH
 - 50 cans (covers EOM + 3)
 - 19 of 50 for STS-108, 8 additional cans for STS-110 stowed in MPLM

Mission Summary

- Primary objectives
 - Rotate expedition crews, perform crew handover
 - Transfer critical cargo (MPLM, middeck)

- Secondary objectives
 - Execute EVA during docked phase from Shuttle Airlock
 - Install Beta Gimbal Assembly (BGA) Thermal Blankets
 - Perform EVA Get Ahead Tasks
 - Perform O2 transfer test
 - Perform LiOH DTO
 - Perform middeck payload experiments
 - Perform MACH-1 experiments
 - Deploy STARSHINE-2 satellite

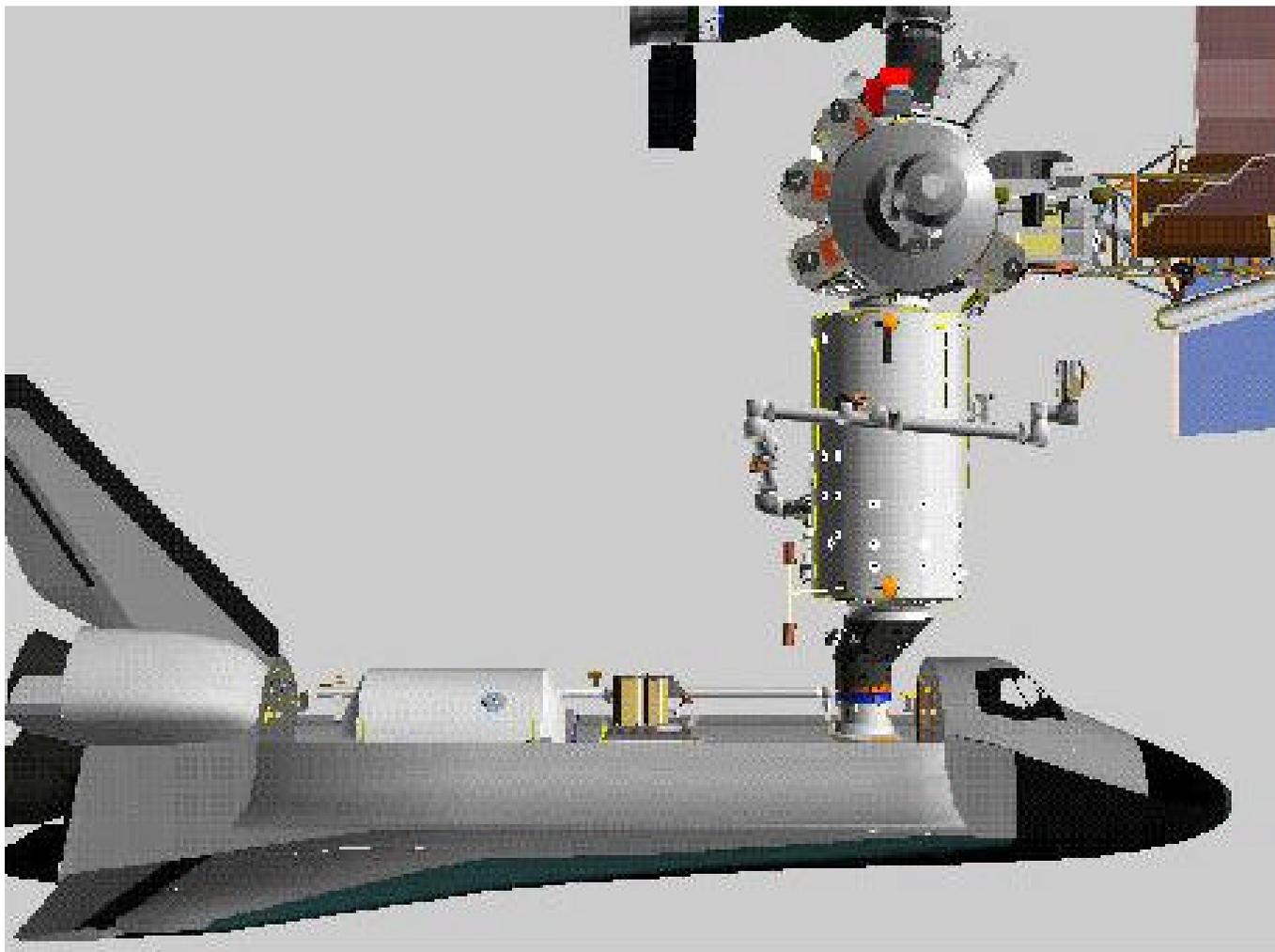
Mission Summary

- During the stage:
 - 6 Progress-M1 unloading and departure and deployment the Kolibri satellite from the Progress after undocking
 - Reboosts
 - Perform 2 Orlan EVA's
 - January 14th - move the Strela-2 boom from PMA1 to the Russian Segment
 - January 24th - install SM thruster plume deflectors, HAM radio antennas, witness plates, and Platan-M, change out the Kromka, and deploy SM solar array flaps
 - 7 Progress-M1 docking and unloading
 - ISS CCS MDM Revision 2 software upload and execution
 - Prepare crew and station for 8A assembly tasks
 - Execute 8A
 - 3 Soyuz and 4 Soyuz swap

Mission Overview

- Flight Day 1
 - Launch (19:36:02 EST)
 - MPLM environment check
- Flight Day 2
 - SRMS checkout
 - Orbiter Docking System checkout
 - OSVS checkout
 - Rendezvous tools checkout
 - EMU checkout, Part 1
 - MPLM environment check
 - PSRD attitude during crew sleep

Docked Configuration

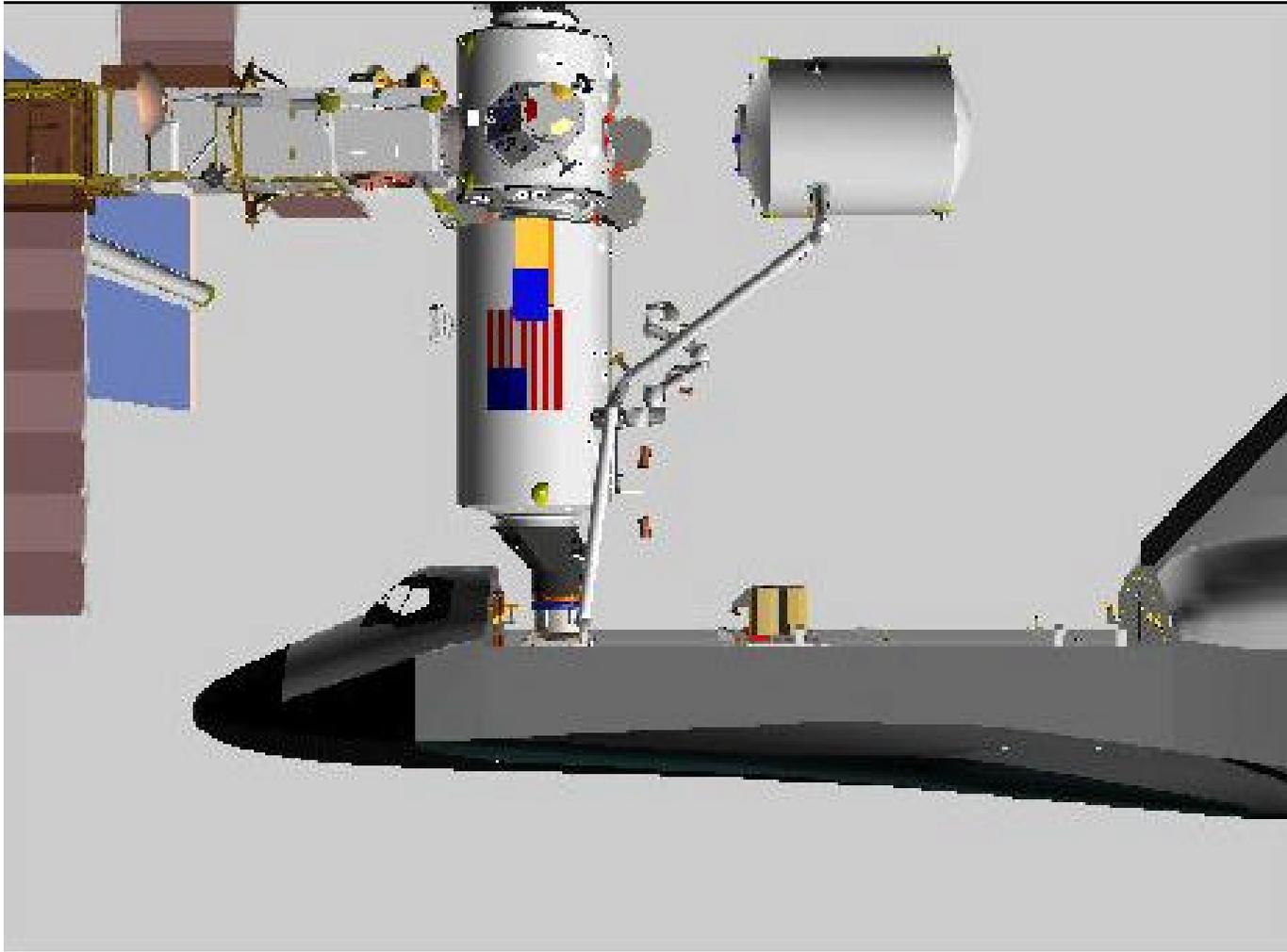


Mission Overview

- Flight Day 3
 - ISS maneuver to docking attitude, feather arrays
 - Shuttle water dump
 - Rendezvous and docking
 - Crew safety briefing once hatches opened
 - EMU setup
 - MPLM environment check

- Flight Day 4
 - MPLM mate to ISS, activation, and ingress
 - Soyuz seat liner transfer and installation
 - Once complete, Expedition 4 crew becomes the ISS crew
 - Middeck and ISS swap of powered payloads
 - ISS crew handover
 - PAO event

MPLM install



Mission Overview

- Flight Day 5
 - ISS crew handover
 - MPLM and middeck transfers
 - EVA preparation/Orbiter depress to 10.2 psi
- Flight Day 6
 - ISS crew handover
 - MPLM transfer
 - BGA thermal blanket installation EVA

Mission Overview

- Flight Day 7
 - ISS crew handover
 - Transfer
 - Water dump
 - ISS PAO event

- Flight Day 8
 - ISS crew handover
 - Transfer
 - Crew conference with both crews

Mission Overview

- Flight Day 9
 - MPLM egress
 - MPLM deactivation and transfer from ISS to Orbiter payload bay
 - ISS crew handover
 - Undocking preparation
- Flight Day 10
 - ODS preparation for undocking
 - Orbiter undocking and flyaround
 - Water dump
 - Off duty and exercise
 - PSRD attitude during crew sleep

Mission Overview

- Flight Day 11
 - FCS checkout, RCS hotfire, and deorbit prep activities
 - STARESHINE-2 deploy
 - Cabin stow
 - MPLM environment check
- Flight Day 12
 - Deorbit prep
 - Deorbit
 - Landing ~10/19:44 MET 344/20:20:00 GMT (/15:20:00 EST)

MISSION OPERATIONS DIRECTORATE FLIGHT DIRECTOR OFFICE



STS-108/ISS UF-1 MISSION OPERATIONS

FLIGHT READINESS REVIEW

November 15, 2001

DA8/N. W. Hale

Agenda

- | | |
|--|------------------------|
| • Shuttle Flight Software | No Issues |
| • Station Flight Software | No Issues |
| • Flight Design & Ascent Overview | No Issues* |
| • Flight Procedures Shuttle/Station | No Issues |
| • Joint Operations Integrated Procedures | No Issues |
| • Houston/Moscow Support Groups | No Issues |
| • Crew Training | No Issues |
| • Flight Controller Training | No Issues |
| • Significant Flight Rules | To Be Presented |
| • Special Topics | None |
| • Open Work | To Be Presented |
| • Network | To Be Presented |
| • USA Flight Operations | To Be Presented |
| • Readiness Statements | Included |
- * Back-Up Material Included

STS-108/UF-1 Significant Flight Rules

- Flight-Specific Joint Rules
 - Mission priorities defined
 - NOTE: Not all priority objectives can be accomplished during nominal mission duration
 - Prop and non-prop priorities defined
 - Starshine deploy rules defined
- Shuttle Only
 - Pilot Flying
 - Use of GPS for contingency situations
- ISS Only and Stage Rules
 - Priorities

STS-108/UF-1 Open Items

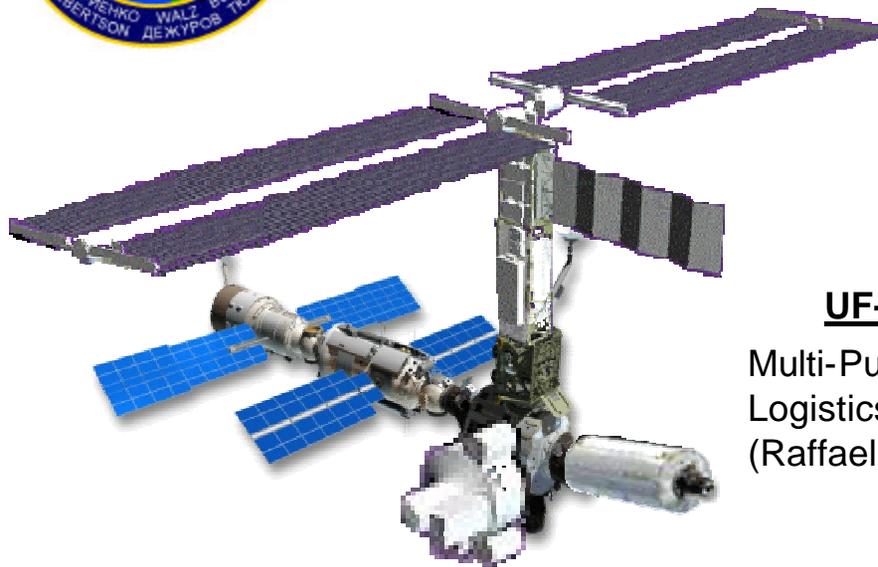
- BGA Thermal Blanket Installation
 - More than usual work open due to late definition–
 - All work to prepare and train for EVA is planned to be complete before launch



STS-108/ISS UF-1 FRR Space Communication & Data Systems



STS-108 ISS UF-1 Flight Readiness Review Networks



UF-1
Multi-Purpose
Logistics Module
(Raffaello)

Agenda

- Other SN Supported Launches
- Significant Changes

Ted Sobchak
Network Director
GSFC/Code 450
November 15, 2001



STS-108/ISS UF-1 FRR

Space Communication & Data Systems



Other SN Supported Launches

- **One SN supported launch is planned during the STS-108 mission**
 - **Delta II JASON/TIMED on December 7 from Western Range**
 - **Critical support to the TIMED mission via the SN is planned.**
 - **Possible Network resource conflicts with TIMED begin ~30 hours prior to undocking**
 - **Scheduling ISS/STS Virtual Spacecraft events may resolve some SN conflicts**



STS-108/ISS UF-1 FRR

Space Communication & Data Systems



Significant Changes

- **Space Network**
 - NASA has accepted the TDRS-H spacecraft from Boeing. It will not be used for STS-108. Developing a plan to transition spacecraft into operations.
- **Ground Network**
 - **GN IP Commanding**
 - On-Orbit testing planned with MIL, WPS, and DFRC. NISN Engineering evaluating closely.
 - **MIL**
 - System software was delivered to correct known problems in the following systems:
 - RF Subsystem Controller
 - UHF System controller
 - Site Status Messages
 - Command System Controller
 - Link Monitor Processor



STS-108/ISS UF-1 FRR

Space Communication & Data Systems



Significant Changes

- **DOD Radars**
 - JDIC is down for Antenna overhaul until Dec 22 - No impact
 - CMTC is down for relocation until April 15, 2002 - No impact

- **NISN**
 - All required new voice and data services for ISS are installed
 - Russian Circuits
 - Performed maintenance upgrade of mission circuit multiplexers
 - ISS Video Distribution
 - Critical SSRMS activities during ISS UF-1 will share Transponder 9 with NASA TV. Continue work to implement video over IP fiber to MSFC and CSA.



Space Communication and Data Systems



Certificate Readiness

Pending completion of flight readiness preparations, remaining standard work and closure of all action items, NASA dedicated elements and all CSOC resources are ready to support the STS-108/12th ISS Flight (UF-1) - Raffaello (MPLM)

(Original signed by)

P. Liebrecht **Date**
Associate Director, Program Manager for Mission Services
Goddard Space Flight Center

(Original signed by)

G. Morse **Date**
Manager, Space Operations Services
Johnson Space Center

(Original signed by)

D. Tighe **Date**
CSOC Program Manager

Presenter:

R. Gest

Organization/Date:

Flt Ops/Date: 11/15/01

**STS 108/UF1
Flight Readiness Review
11/15/01**

USA Flight Operations

AGENDA

Presenter:

R. Gest

Organization/Date:

Flt Ops/Date:11/15/01

- Facilities Readiness
- Flight Design, Product and Training Readiness
- Out of Family - None
- Special Topics - None
- CoFR Statement

FACILITIES READINESS

Presenter:

R. Gest

Organization/Date:

Flt Ops/Date: 11/15/01

- Mission Control Center (MCC)
 - Software changes
 - MCC platform system software release – Callisto 2.2
 - New Capabilities
 - MCC capability to uplink SSMMU firmware
 - ISS software uplink capability to transition from R1 to R2
- Trajectory Services Upgrade (TSU) – Flight Following
 - TSU moves trajectory processing off the MOC and onto the distributed system
 - First flight of Nav TSU to be flight following in the Ops environment – all flight phases
 - Activities will mirror activities of the Flight Control Team to demonstrate workstation based trajectory capabilities
 - All STS-108 mission trajectory operations will be performed on the MOC.

FACILITIES READINESS

Presenter:

R. Gest

Organization/Date:

Flt Ops/Date:11/15/01

- Mission Control Center (MCC)
 - Process Escapes
 - MCC Callisto 2.1 load built using an incorrect data file - Impacted telemetry stream data and status messages.
 - Load rebuilt and redelivered as Callisto 2.2 with correct data file - recompile not required.
 - Flight Rationale: Standard planned simulation and testing activities will fully verify Callisto 2.2 load functionality. Complete load audit was performed to verify correct versions of all files. Risk assessment – green.
 - Corrective Action: CSOC has implemented both automated and manual configuration management steps during load build process to ensure correct file selection. Additional verification step implemented prior to incorporating the load into the MCC.

FACILITIES READINESS

Presenter:

R. Gest

Organization/Date:

Flt Ops/Date: 11/15/01

- Mission Control Center (MCC)
 - Process Escapes
 - Two non-critical trajectory workstation applications incorrectly promoted from development area, instead of CM area, to an Ops area. Development apps tested and certified for flight.
 - Process escapes were identified in a standard L-30 software audit.
 - Flight Rationale: Both applications code compared to the CM versions and verified to be functionally identical. Both applications passed certification and have been in use since August. Risk assessment – green.
 - Corrective Action: NCR written. Software promotion procedure is under review to determine changes required to prevent reoccurrence.

FACILITIES READINESS

Presenter:

R. Gest

Organization/Date:

Flt Ops/Date:11/15/01

- Integrated Planning System (IPS)
 - Significant Anomalies
 - An undetected disk read error on IPS Compute Nodes (CN) 5 & 6 found during the STS-108 flight design process. (Data read incorrectly and no error message generated)
 - Troubleshooting test script developed and identified two bad interface cards.
 - Cards removed and replaced.
 - Failure root cause under investigation - IBM has determined interface cards defective when shipped.
 - All Flight products re-validated for STS-108 - No errors

FLIGHT DESIGN, PRODUCT, And TRAINING READINESS

Presenter:

R. Gest

Organization/Date:

Flt Ops/Date: 11/15/01

- Products
 - All products are compliant with latest versions of the FPRB and IIDP, and scheduled to completed on time.
- Flight Design
 - Design meets all NASA requirements (FDRD, FRD, etc.)
 - Limit or thermal violations – none
- Procedures
 - STS 108/ UF1 FDF and ODF Status – on schedule, standard open work remains.
- Training
 - Crew and Flight Controller training is on schedule and will be completed prior to launch.
- User Applications
 - All user applications that support real-time operations are certified and incorporated into the Ops baseline.



STS-108/UF1 Certification of Flight Readiness	Presenter: R. Gest
	Organization/Date: Flt Ops/Date:11/15/01

- The USA Flight Operations FRR, NASA MOD FRR, and USA SFOC Pre-FRR have been completed
- All Contractor Accountable Functions (CAF) have been completed, or are scheduled for completion, in accordance with NASA requirements and the applicable portions of the Space Flight Operations contract Flight Preparation Process Plan (NSTS 08117, section 8.5.18 and appendix “R”).
- All required products have been or are scheduled to be delivered per requirements.
- All Facilities have been configured and are ready for mission support.
- All CAF personnel are trained and certified or will be trained and certified prior to flight.
- Flight crew has been trained.
- There are no open issues.
- Pending completion of the defined open work.

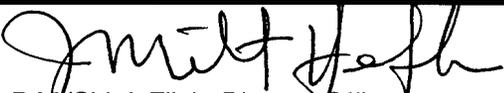
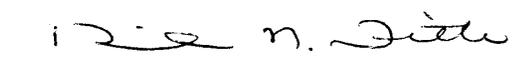
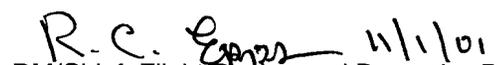
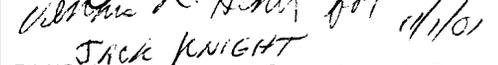
**USA FLIGHT OPERATIONS IS READY
TO SUPPORT THE STS 108/UF1 MISSION**



C. Knarr
Deputy Associate Program Manager, Flight Operations

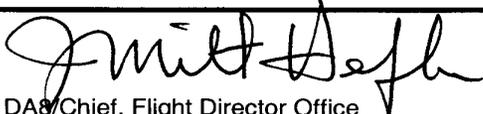
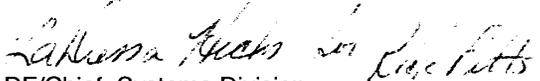
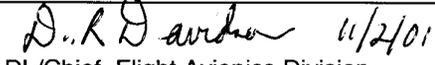
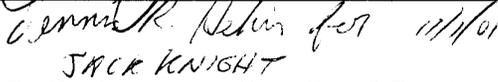
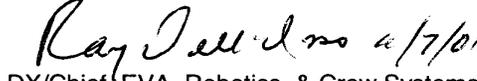
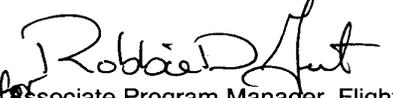


MISSION OPERATIONS DIRECTORATE
SHUTTLE CERTIFICATE OF FLIGHT READINESS (CoFR)
FLIGHT: STS-108/UF1 REQUIREMENTS

Critical Processors/Applications, Non-Crit Processors/Applications; Flight Rules: EMCC: Trng-MCC /POCC; FTP-New Operations; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Exception Resolution; CMD Proc; FPPP Requirements Met; Contractor Process Insight	 DA/Chief, Flight Director Office
Crit Processors/Applications; Non-Crit Processors/Applications; FDF; EMCC; TRNG-MCC/POCC; LCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; FPPP Requirements Met; Contractor Process Insight	 DF/Chief, Systems Division
Crit Processors/Applications; Non-Crit Processors/Applications; FDF; EMCC; RECON-Flight S/W (MMU); TRNG-MCC/POCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Level II Actions; Mission Requirements; CMD Proc; FPPP Requirements Met; Contractor Process Insight	 DM/Chief, Flight Design and Dynamics Division
Crit Processors/Applications; Non-Crit Processors/Applications; FDF; FDF Manage; EMCC; PGSC; TRNG-MCC/POCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; FPPP Requirements Met; Contractor Process Insight	 DO/Chief, Operations Division
EX/AI from Prior Reviews; No Constraints; Level II Actions; Mission Requirements; FPPP Requirements Met; Contractor Process Insight	 DT/Chief, Space Flight Training Division
FPPP Requirements Met; Contractor Process Insight	 DV/Chief, Advanced Operations & Development Division
FAC-NBL; FAC-SVMF; FDF; TRNG-Crew Trng; TRNG-MCC/POCC; TRNG-EVA/MARS; LCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; EVA Hardware Integration; Contractor Process Insight	 DX/Chief, EVA, Robotics, & Crew Systems Operations Division
FAC-MCC; FAC-Network Interface; FAC-SMS; FAC-SPF; FAC-IPS ; Crit Processors/Applications; Non-Crit Processors/Applications; FD-Trajectory; FD-Consumables; FD-PDRS; FD-Analyst Cert; FD-CTF; FDF Manage; EMCC; RECON-STAR/MASTII/CD ROM Products; RECON-MCC; TRNG - Crew Trng; TRNG-MCC/POCC; TRNG-SMS; FTP-New Ops; Flight Anomaly Res; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; Exception Resolution; CMD Proc; FPPP Requirements Met	 Associate Program Manager, Flight Operations, SFOC
EMCC; NETWORK; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Level II Actions; FPPP Requirements Met	 Network Director, SSP-ISSP, GSPC
	 Mission Operations Director

MISSION OPERATIONS DIRECTORATE
ISS CERTIFICATE OF FLIGHT READINESS (CoFR)
FLIGHT/INCREMENT: STS-108/UF1 AND SUBSEQUENT INCREMENT OPERATIONS

ISS REQUIREMENTS

Critical Processors/Applications; Non-Crit Processors/Applications; Flight Rules; EMCC; Trng-MCC /POIC/POCC; JOP-New Operations; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Program Actions; Mission Requirements; Exception Resolution; CMD Proc; Contractor Process Insight	 DA3/Chief, Flight Director Office
Crit Processors/Applications; Non-Crit Processors/Applications; ODF/SODF; EMCC; TRNG-MCC/POIC/POCC; LCC; JOP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Program Actions; Mission Requirements; CMD Proc; EVA Hdwr; Contractor Process Insight	 DF/Chief, Systems Division
EX/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; Contractor Process Insight	 DL/Chief, Flight Avionics Division
Crit Processors/Applications; Non-Crit Processors/Applications; TRNG-MCC/POIC/POCC; JOP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; CMD Proc; FD-Flight Mechanics, FD-Analyst Cert. FD-CTF	 DM/Chief, Flight Design and Dynamics Division
Crit Processors/Applications; Non-Crit Processors/Applications; ODF/SODF; ODF/SODF Manage; EMCC; TRNG-MCC/POIC/POCC; JOP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Program Actions; Mission Requirements; CMD Proc; Contractor Process Insight	 DO/Chief, Operations Division
EX/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; Contractor Process Insight	 DT/Chief, Space Flight Training Division
The SSTF maintains a training load consistent with the last training environment for the increments in progress which can, on demand be loaded and updated to the required onboard configuration for any necessary procedure development; contractor process insight.	 DV/Chief, Advanced Operations & Development Division
FAC-NBL; FAC-SVMF; FDF; TRNG-Crew Trng; TRNG-MCC/POCC; TRNG-EVA/MARS; LCC; FTP-New Ops; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; CIL/Hazards; No Constraints; Level II Actions; Mission Requirements; Engineering Drawings; CMD Proc; EVA Hardware Integration; Contractor Process Insight	 DX/Chief, EVA, Robotics, & Crew Systems Operations Division
FAC-MCC; FAC-Network Interface; FAC-IPS; Crit Processors/Applications; Non-Crit Processors/Applications; ODF/SODF Fabrication; Flight Anomaly Res; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Program Actions; Mission Requirements; Exception Resolution; CMD Proc	 Associate Program Manager, Flight Operations, SFOC
NETWORK; Flight Anomaly Resolution; Anomaly-Proc; Ex/AI from Prior Reviews; No Constraints; Program Actions	 Network Director, Shuttle, GSFC
	 Mission Operations Director

STS-108/UF1 FLIGHT READINESS STATEMENT



THE MISSION OPERATIONS FLIGHT PREPARATION PROCESS PLAN DOCUMENTED IN NSTS 08117, REQUIREMENTS AND PROCEDURES FOR CERTIFICATION OF FLIGHT READINESS, HAVE BEEN SATISFIED. REQUIRED PRODUCTS AND OTHER RESPONSIBILITIES FOR MISSION OPERATIONS (NSTS 08117, SECTION 8, PARAGRAPH 8.5.7) HAVE BEEN OR WILL BE PRODUCED OR COMPLETED. ALL AREAS ARE READY. MISSION OPERATIONS IS PREPARED TO SIGN THE CERTIFICATE OF FLIGHT READINESS FOR STS-108/UF1.

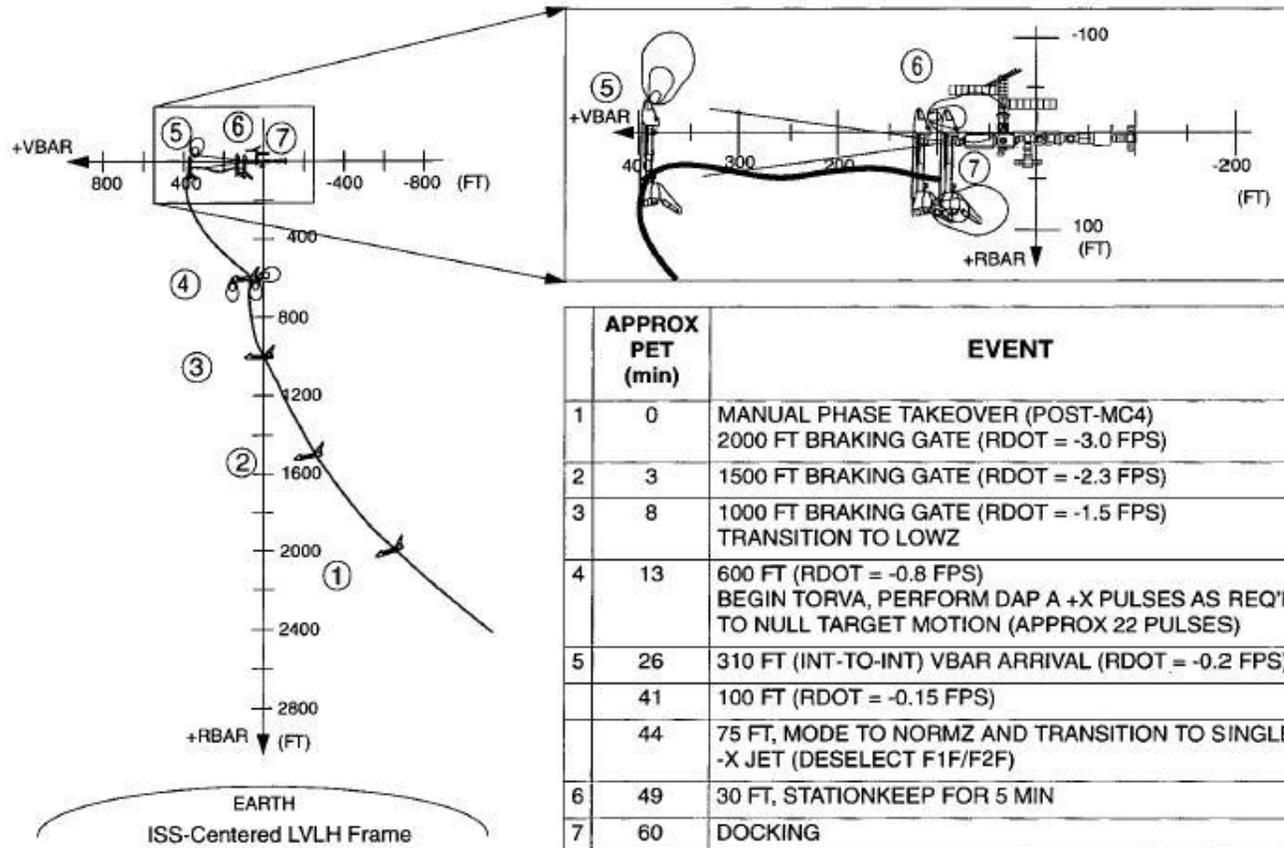
J.M. Mefflin
MISSION OPERATIONS DIRECTOR

C. L. VERMILYEA
VICE PRESIDENT AND ASSOCIATE
PROGRAM MANAGER, FLIGHT
OPERATIONS, SPACE FLIGHT OPERATIONS
CONTRACT

Back-Up Charts

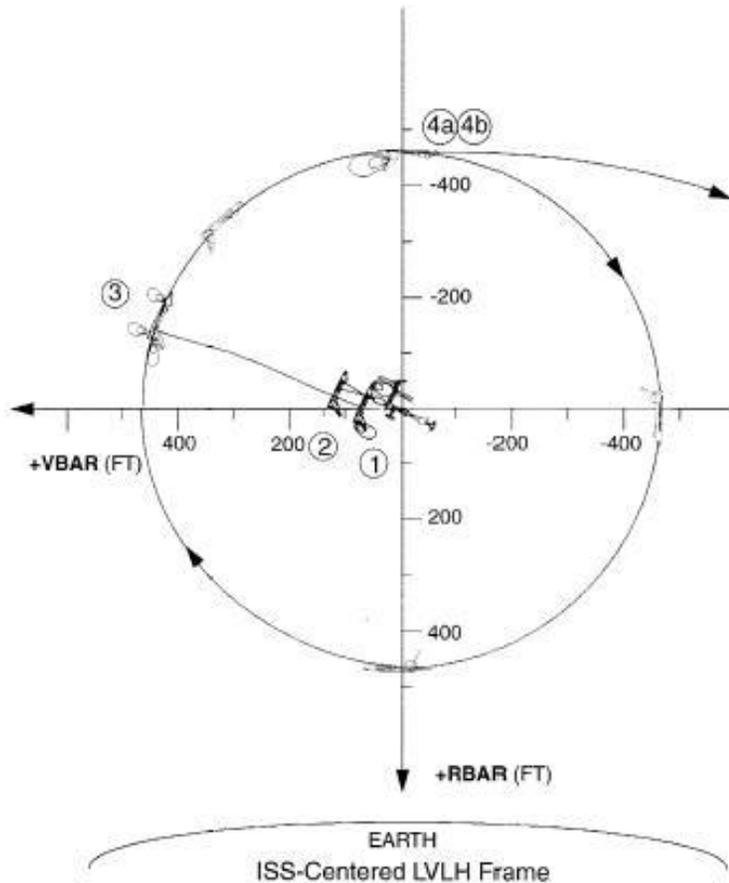
Docking to ISS

TERMINAL PHASE, TORVA, AND VBAR APPROACH



Undock

UNDOCKING, TORF, AND FINAL SEPARATION



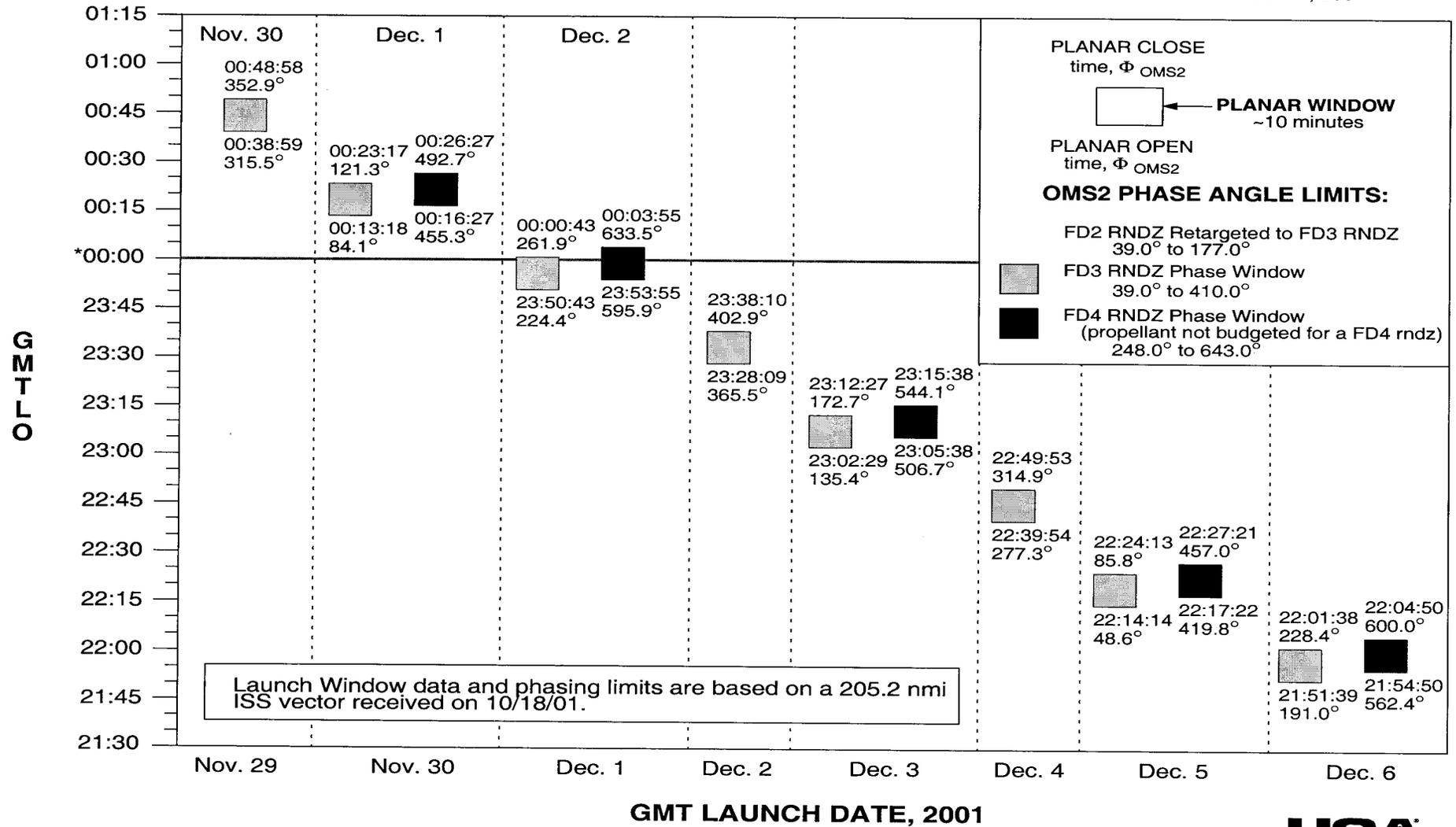
	APPROX. PET (min)	EVENT
	-3	ORBITER AND ISS IN FREE DRIFT TO BEGIN UNHOOKING PROCESS IN ISS LVLH MATED TEA ATTITUDE (25,0,0)
1	0	UNDOCKING; AT 2 FT MODE TO LVLH HOLD AND PERFORM 4 DAP B +Z NORMZ BURNS SEPARATED BY 10 SEC; 3 MIN LATER PERFORM +Z NORMZ BURNS OUTSIDE 30 FT TO BUILD TO 0.2 FPS; MAINTAIN CORRIDOR
	4	OUTSIDE 50 FT, RESELECT -X JETS (F1F, F2F)
2	5	AT 75 FT, MODE TO LOWZ, MANEUVER BACK TO TEA ATTITUDE IN AUTO; MAINTAIN CORRIDOR AND OPENING RATE GREATER THAN OR EQUAL TO 0.2 FPS
3	25	AT 450 FT, NULL RDOT AND INITIATE TWICE ORBITAL RATE FLYAROUND (TORF); MAINTAIN 400 FT < R < 500 FT (CG-TO-CG)
4a	34	AT MINUS RBAR: IF PROP AVAILABLE CONTINUE 1 LAP TORF*
4b	34 or 80	IF PROP NOT AVAILABLE OR AFTER 1 LAP, PERFORM 3 FPS RETROGRADE +X LOWZ FINAL SEP BURN; INITIATE TARGET TRACK 2 MIN LATER

Back-Up Charts

Mission Duration = 11+0+2
 Inclination = 51.6°
 Target ha/hp = 211 x 199 nmi.

STS-108 DAILY PLANAR / PHASE WINDOW

J. Ollivierre/USH-483L
 C. Johnson/USH-483L
 October 24, 2001



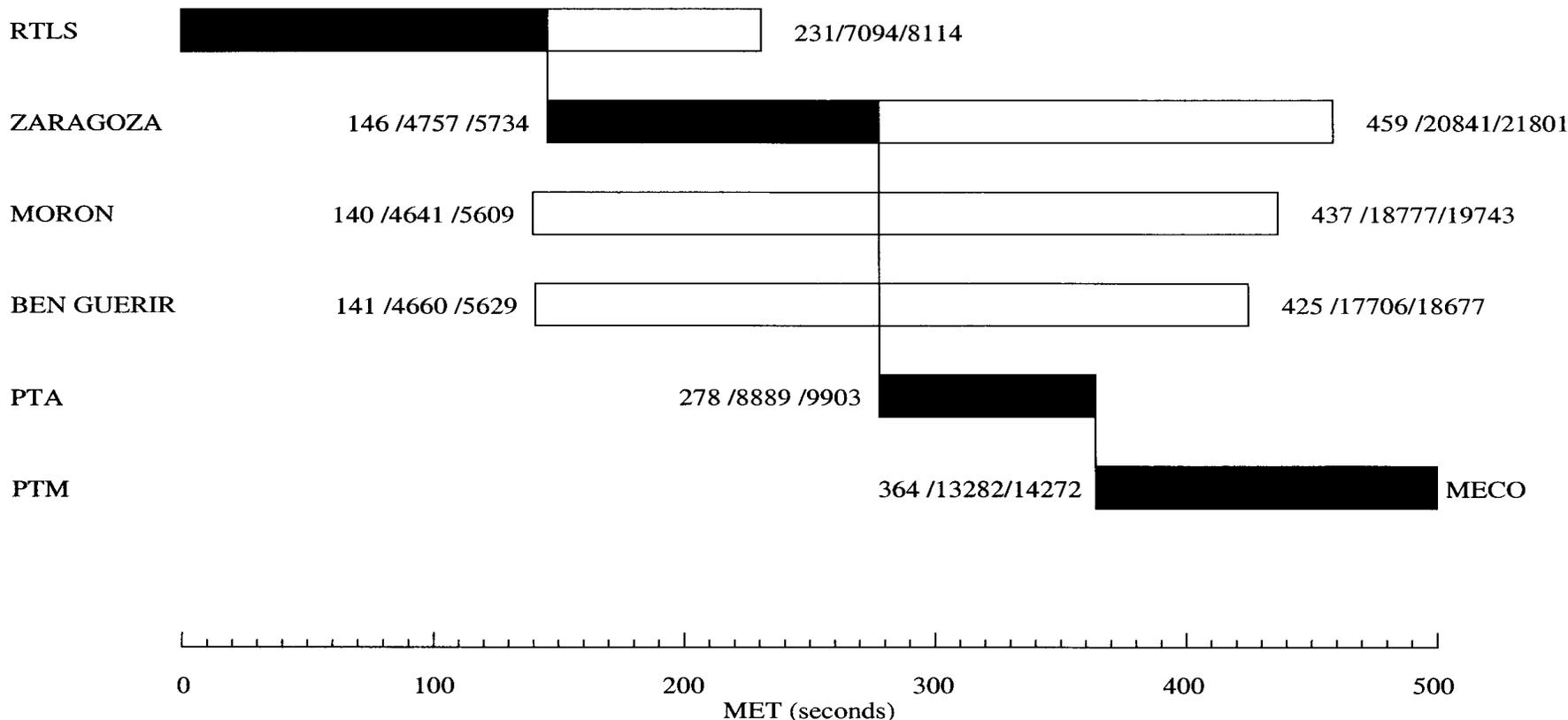
Abort Regions Chart

STS-108 FRR

TDDP: FRRAF108(003)
 Ascent Performance Margin: 3394 lbs
 Ascent Intact Engineer: Scott Schuh
 Date: Sat Oct 13 17:24:39 CDT 2001

LEGEND		
_____	E.O. Time (sec)	/Rel. Velocity (fps)
_____	/Inert. Velocity (fps)	

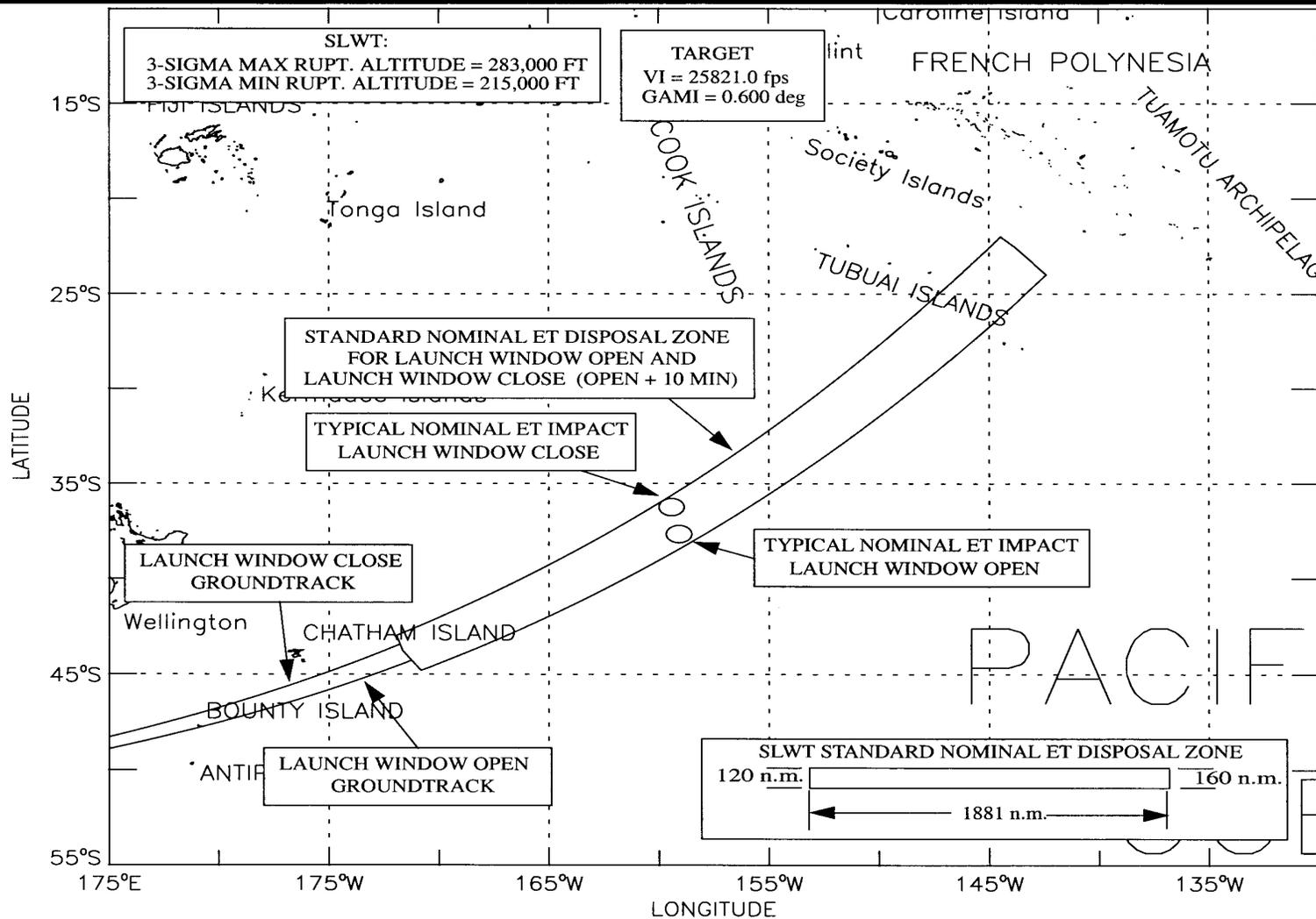
All data presented on this chart is at the opening of a 5 minute window



Last RTLS boundary based on third peak heating. Last RTLS performance boundary: 234 /7198 /8219. The late ZZA boundary is limited by the 23k fps inertial velocity at Abort Initiation constraint. The late MRN boundary is based on the 0 +/- 50 degree beta angle constraint. The late BEN boundary is based on performance.

Nominal ET Impact Area

STS-108



FLIGHT DESIGN AND DYNAMICS
 D48440 - 11/01/01

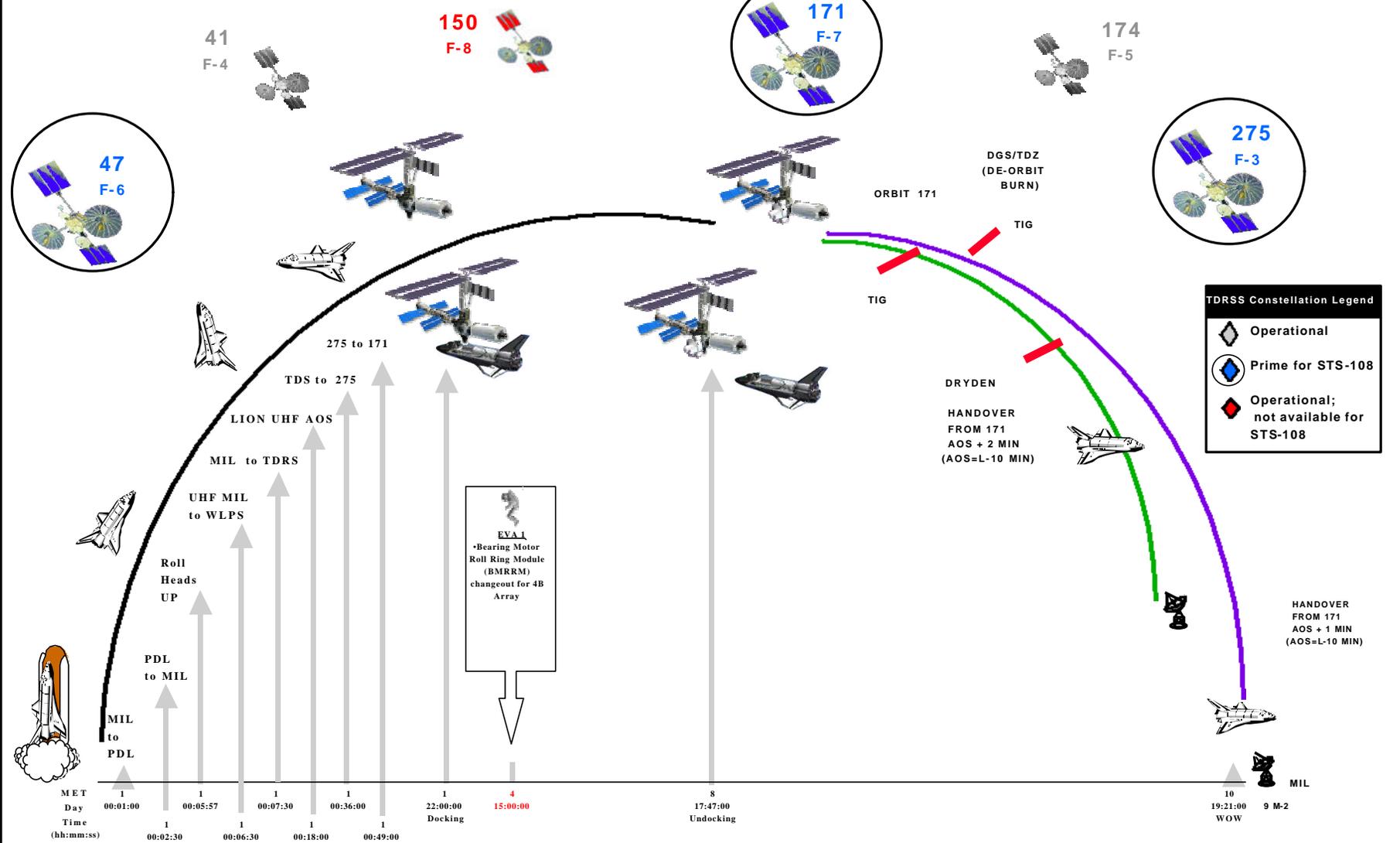
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STS-108/UF-1 FRR Mission Services



Integrated Networks Activity



STS-108/UF-1 FRR/MOD

STS-108/UF-1 Daily Planar Windows November 6 TOPO Vector

