MISSION OPERATIONS DIRECTORATE
FLIGHT DIRECTOR OFFICE

STS-113/11A
MISSION OPERATIONS

FLIGHT READINESS REVIEW

October 31, 2002

DA8/R. E. Castle
DA8/M. A. Kirasich

Agenda

• Mission Summary	**To Be Presented**
• Shuttle Flight Software	No Issues
• Flight Design & Ascent Overview	No Issues
• Flight Procedures	No Issues
• Joint Operations Integrated Procedures	No Issues
• Crew Training	No Issues
• Flight Controller Training	No Issues
• Significant Flight Rules	No Issues
• Special Topics	**SSRMS Close Call**
• Open Work	No Issues
• Network	**To Be Presented**
• USA Flight Operations	**To Be Presented**
• Readiness Statements	Included

Mission Summary

STS-113/11A Overview

OV-105 - Endeavour

Crew

- Shuttle:
  - CDR – Jim Wetherbee PLT – Paul Lockhart
  - MS1/EV1 – Mike Lopez-Alegria MS2/EV2 – John Herrington
- Departing ISS Crew:
  - CDR – Valeri Korzun FE2 – Sergei Treschev
  - FE1 – Peggy Whitson
- Arriving ISS Crew:
  - CDR – Ken Bowersox FE2 – Don Petit
  - FE1/Soyuz CDR – Nikolai Budarin

Mission Duration 11+1+2

Three planned EVAs, capability for one unscheduled EVA

6 N2 tanks

5 Cryo Tanks sets: ≥96 hrs of pad hold time

Shuttle Propellant acceptable

- 5.6 nmi reboost covered out of margin

STS-113/11A Mission Priorities

Primary STS-113 objectives in priority order:

- Rotate the Expedition 5 and Expedition 6 Crews
- Install the P1 truss and complete the tasks required for P1 survival
- Complete 12 hours of crew handover and transfer critical equipment/supplies
- Prepare P1/ISS for the following missions
  - ULF1 (Install WETAs (Wireless EVA Transceiver Assembly))
  - 12A (Clear MT path, Checkout MT Work Site 7, Reconfigure MBSU Jumpers)
  - 12A.1 (43 SPDs (Spool Positioning Devices), NH3/N2 line connection, DLA launch locks)
- Complete additional handover/transfer
- Reboost ISS, Deploy MEPSI

EVA Strategy

- In general, the 3 11A EVAs are planned according to mission priorities
  - Tasks required for P1 survival are performed first, followed by tasks required for ULF1, then 12A, then 12A.1.
- 1 EVA required for truss survival and ULF1 support
- 2 EVAs required to complete tasks required for 12A assembly
- 3 EVAs required to complete all Category 2 tasks

STS-113/11A Mission Overview

FD 1

- Launch 11/10/02 06:21Z.

FD 2

- Checkout
  - EMU's
  - RMS
  - OSVS
  - Orbiter Docking System

FD 3

- +Vbar ISS Rendezvous; PMA2 Docking
- IELK (Soyuz Seat Liner) Transfer
- EVA Prep
- P1 Install Prep

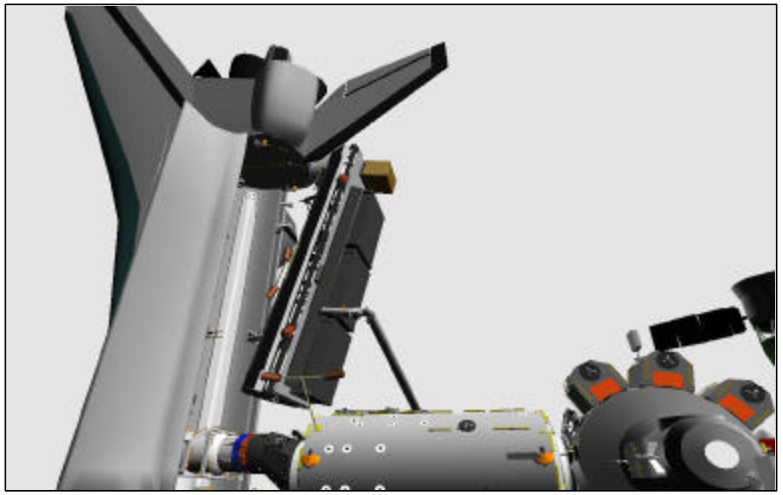
STS-113/11A Mission Overview

FD 4

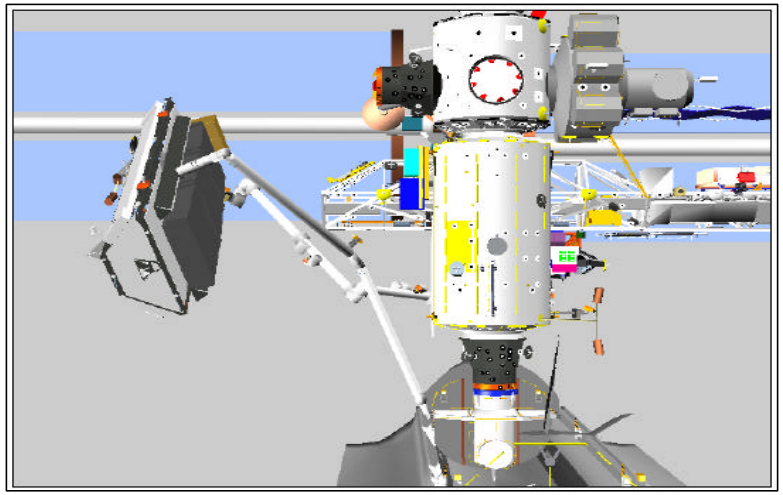
- SRMS unberths the P1 truss and maneuvers to the handoff position
- SSRMS grapples P1 and maneuvers to the Ready-to-Latch position
- P1 capture by the SSAS latch and attached via 4 motor driven bolts
- EVA 1
  - Mate P1/S0 power and data connectors (16 total)
    - MCCH activates P1 ORU's
  - Install the Node WETA
  - Release CETA cart launch locks
  - Remove/stow P1 drag links.
  - Install P1 FHRC (Flex Hose Rotarly Joint) and TRRJ (Thermal Radiator Rotary Joint) Stinger QD SPDs (6)
- SSRMS walk off to the lab

11A FD4 - P1 Truss Installation

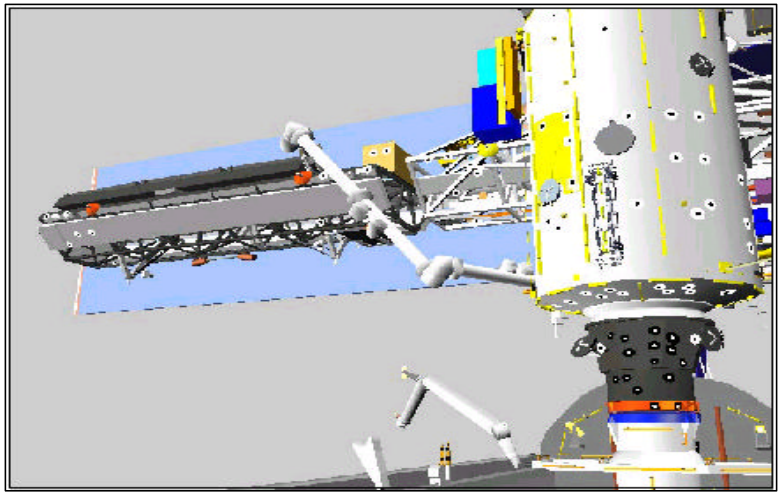
P1 at Low Hover



P1 at Tilt

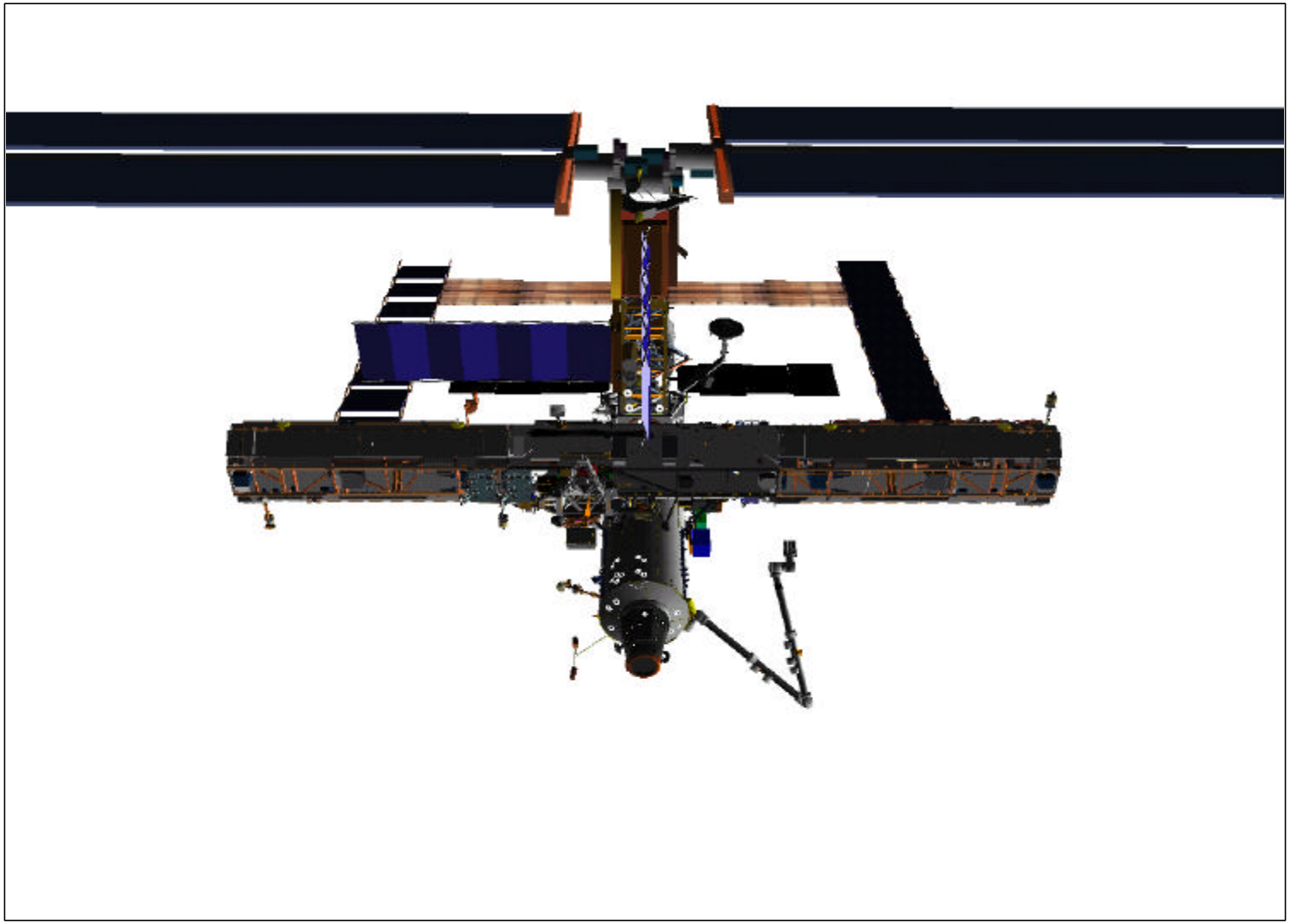


P1 at Handoff



P1 at Pre-Install

ISS Post-P1 Truss Install



STS-113/11A Mission Overview

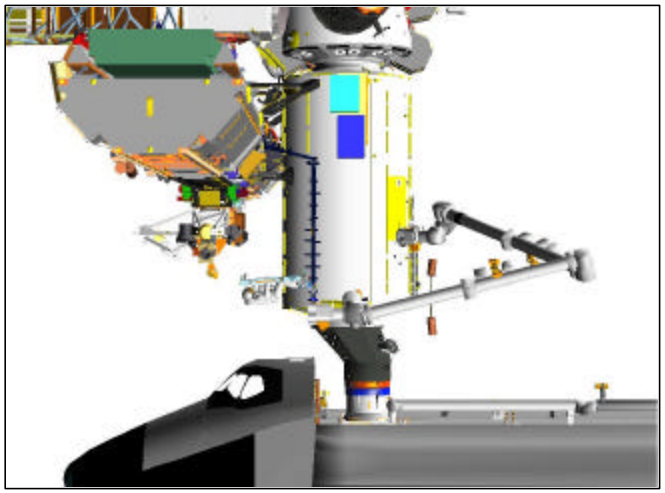
FD 5

- IELK Installation and Sokol Suit Leak Check
- Reboost
- ISS Crew Handover
- Additional Transfer
- EVA 2 preparation

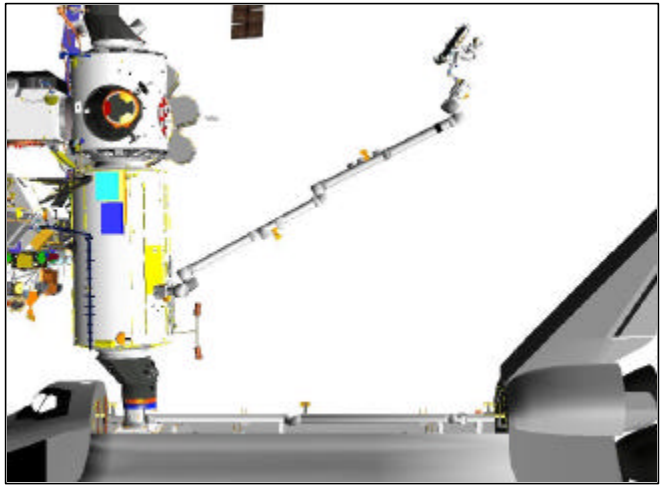
FD 6

- EVA 2
  - Mate the P1/S0 NH3 Fluid Jumpers with SPDs (4)
  - Remove and stow the P1 keel assemblies
  - Install the P1 WETA
  - Checkout P1 SSAS mechanism
  - Relocate the CETA cart from port to starboard

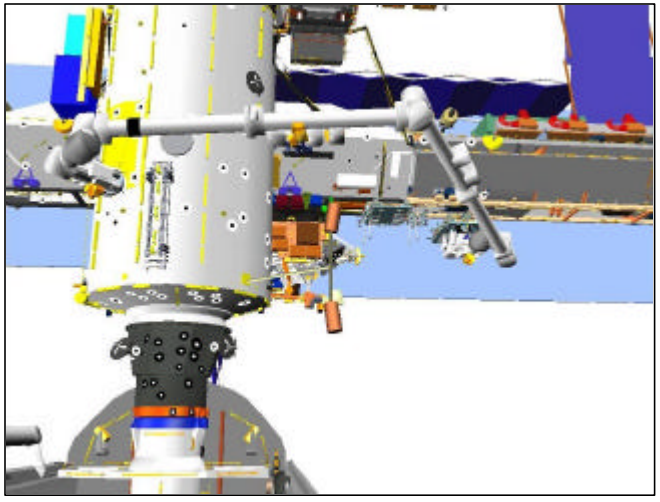
11A FD6 - CETA Cart Move



CETA Cart Pickup



CETA Mid Transit



CETA Install

STS-113/11A Mission Overview

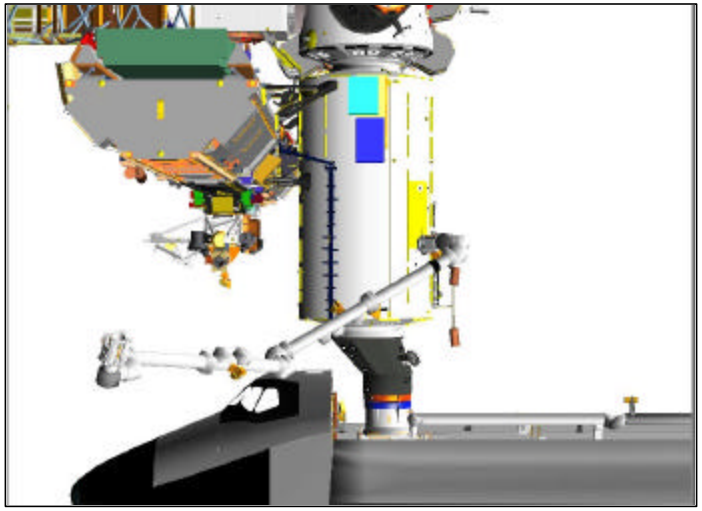
FD 7

- Reboost
- More ISS crew handover, more transfer
- EVA 3 preparation

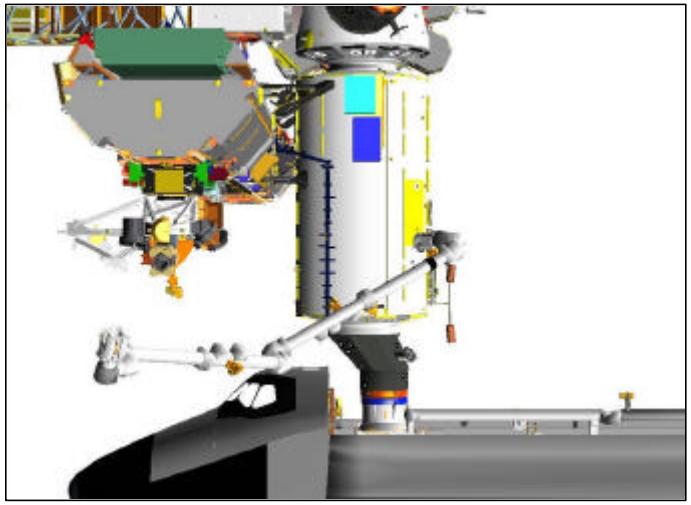
FD8

- Translate the MT from WS4 to WS7 and walk the SSRMS from the lab to to the MBS
- MCCH checkout of S0/S1/P1 MBSUs and DDCUs
  - Main Bus Switching Units and DC to DC Converter Units required for 12A.1
- EVA 3
  - Mate the ATA Fluid Umbilicals
  - Install 33 SPDs
    - Z1/P6, Z1/Lab, Lab Heat Exchanger (EETCS Loop B wet SPDs)
    - P1 Pump Module and P1 RBVM
    - S1 FHRC
  - MBSU Jumper Cable Reconfiguration
- Walk the SSRMS back to the lab and return the MT to WS4.

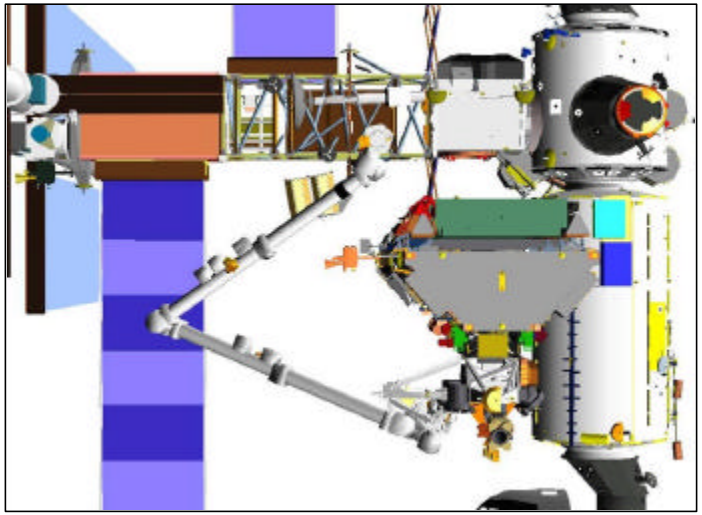
11A FD8 – MT Translation; RBVM SPD Installation



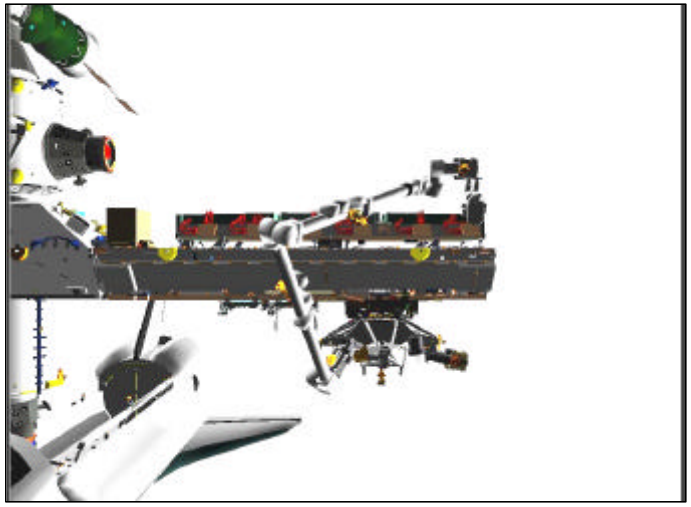
MT at WS4; SSRMS on the Lab



MT at WS7; SSRMS on the Lab



MT/SSRMS at WS7



MT/SSRMS at WS7; EV2 on the SSRMS

STS-113/11A Mission Overview

FD9

- Reboost
- Off duty
- Final transfer and crew handover
- EMU reconfiguration

FD10

- Hatch closing
- Undock
- MEPSI Deploy

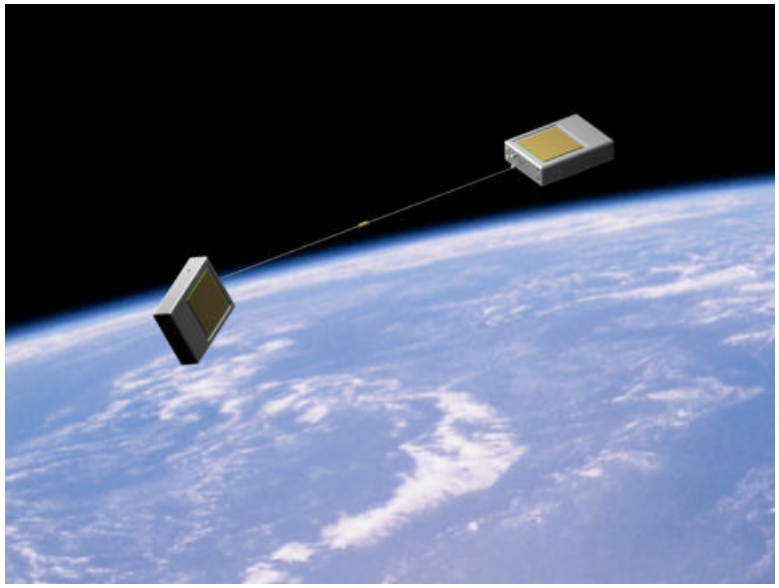
FD11

- End of mission cabin stow
- Off duty

FD12

- Landing (MET 10/20:49)

MEPSI Post-Deploy



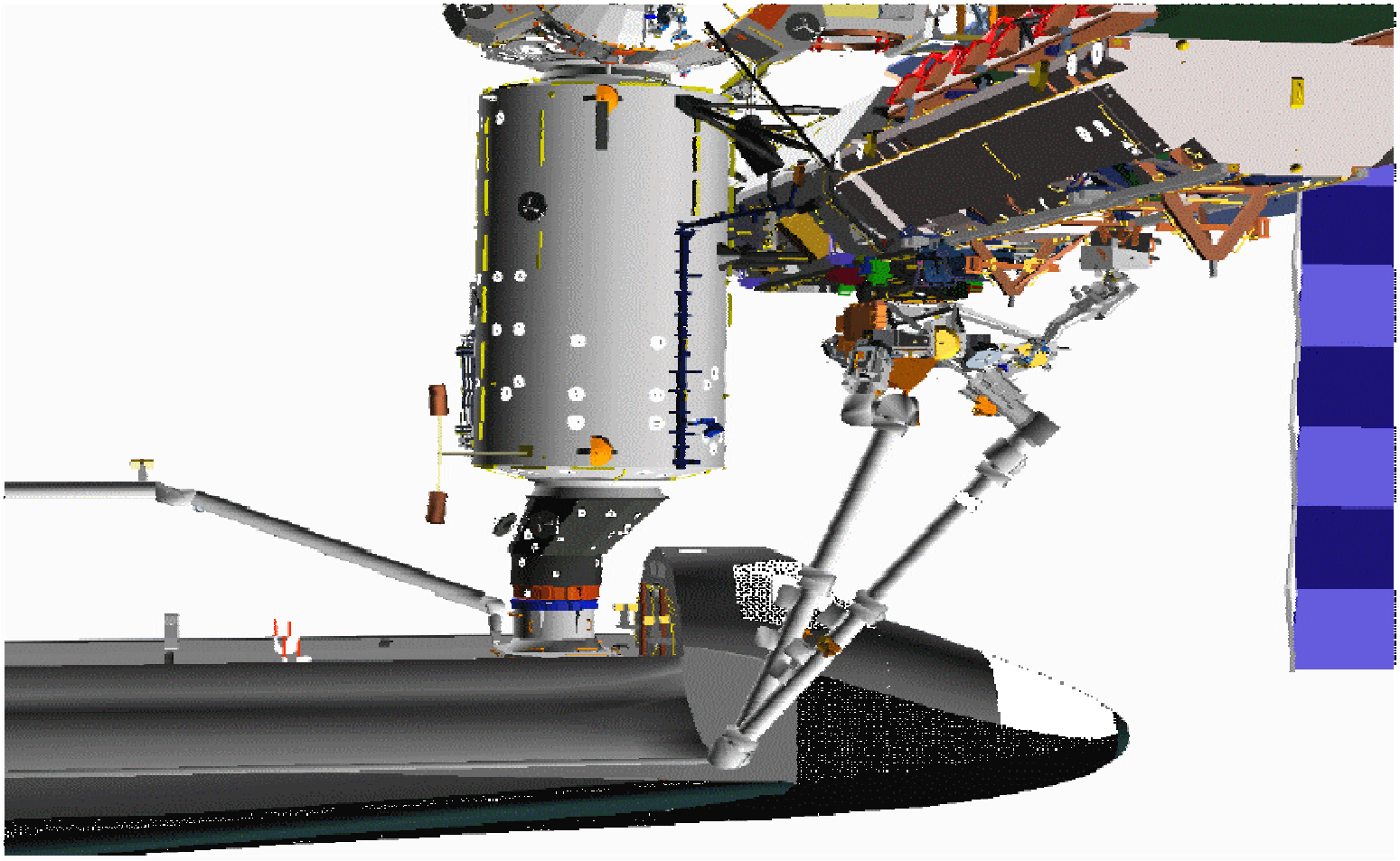
STS-113/11A New or Unique Operations

- First crew rotation on an non-MPLM Shuttle flight
- First CETA Cart Relocation (from port to starboard of MT)
- Second flight the MT has been translated
  - First with the MBS installed
  - First with the patched EXT MDM software
    - Patch to fix problem with automatic latch down sequence discovered on 8A
  - First across an assembled truss interface

Special Topic: STS-112/9A SSRMS Close Call

- This presentation describes the 9A close call and the 11A impacts. The topic will be further addressed generically in the CJOP and JPRCB.
- Background: SSRMS Maneuvers
  - Auto Sequence vs Single Joint vs Manual
- The STS-112 EVA plan included SSRMS support for most EVA tasks
- During EVA1, a manual maneuver from a GCA'ed worksite to a defined position resulted in the SSRMS elbow coming very close to shuttle starboard PLB door
- For this maneuver, the EE was close to the base; small EE movements in this configuration can cause large elbow movements
  - The Crew and the MCC robotics team were aware of this
- When setting up camera views for this maneuver, the crew mistakenly focused on an avionics box instead of the SSRMS elbow
- An MCC initiated All Stop call (per protocol developed post 7A close call) stopped motion.
- Event Summary Preliminary:
  - 17:08:42 ROBO MPSR alerts robotics team to maneuver (Distance: ~7.5 ft)
  - 17:09:13 ROBO MPSR recommends "All Stop" (Distance: ~4.4 ft)
  - 17:09:16 ROBO calls "All Stop" on the FD Loop (Distance: ~4.1 ft)
  - 17:09:19 Capcom makes first "All Stop" call (Distance: ~3.5 ft)
  - 17:09:24 Telemetry shows both Hand Controllers Released (Distance: ~0.0 ft)
  - 17:09:26 Capcom makes second "All Stop" call
    - Note, lag in TLM caused CAPCOM to make second "all stop" call.

Special Topic: STS-112/9A SSRMS Close Call

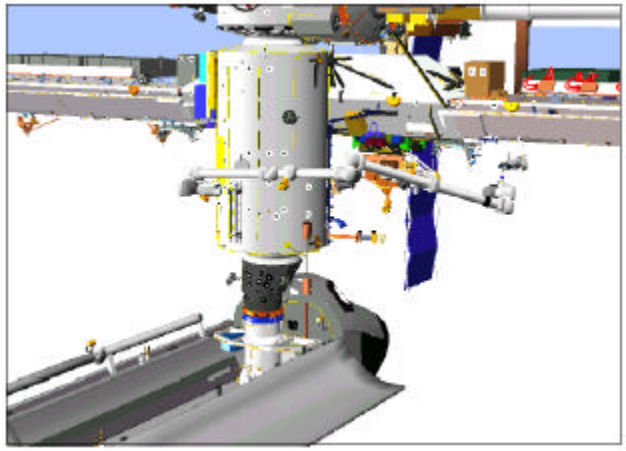


SSRMS at Closet Point

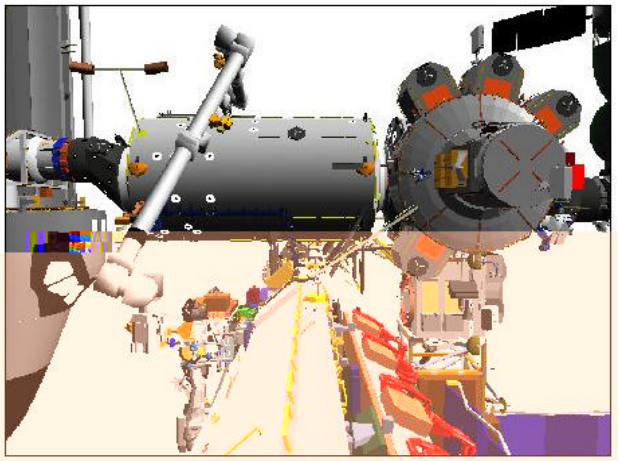
Special Topic: STS-112/9A SSRMS Close Call

- 11A Plan
  - All planned SSRMS operations were reviewed
    - No manual maneuvers with the tip close to the base (9A: 5 ft. / 11A:17ft.)
      - The scenario which led to the 9A close call does not exist on 11A
    - Most maneuvers are auto sequences or single joint
    - Other than EVA GCA maneuvers, manual maneuvers are limited to single axis
  - EVA GCA maneuvers limited to 2 tasks
    - CETA Cart Move on EVA2
    - RBVM QD SPD installation on EVA3
  - Operations team awareness of this concern heightened.
    - E6 crew has been briefed by MOD and STS-112 flightcrew
    - The Flight Directors and Capcoms will be aware of all maneuvers and potential concerns
  - During flight:
    - Daily Summary messages will reinforce areas of concern/which cameras to use.
    - Any changes to planned SSRMS/SRMS ops will be thoroughly reviewed.
    - Add A/G talk capability to the ROBO console.

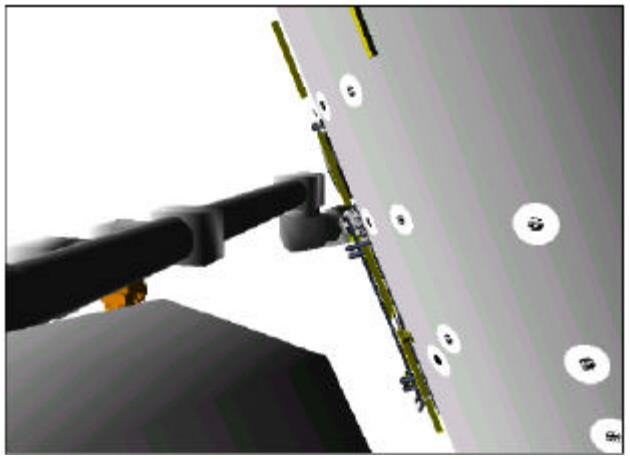
Special Topic: STS-112/9A SSRMS Close Call



CETA Install – Bird's Eye View

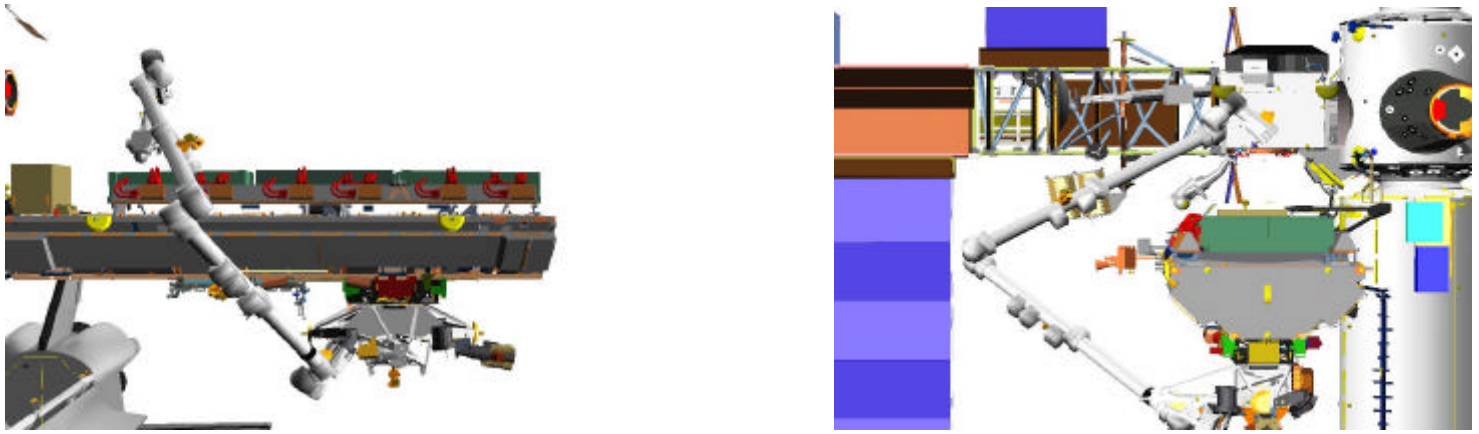


CETA Install – S1 Outboard Lower camera

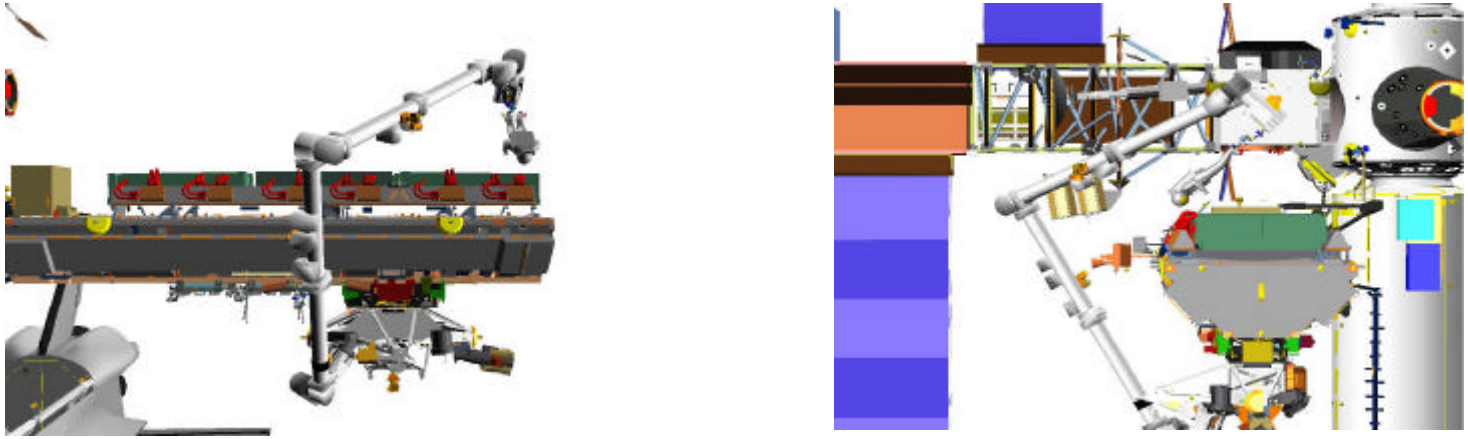


CETA Install – SSRMS Tip Elbow camera

Special Topic: STS-112/9A SSRMS Close Call

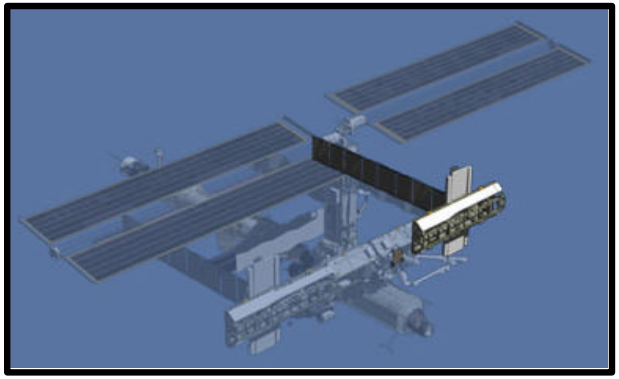


SSRMS Configuration: Start of RBVM Task



SSRMS Configuration: End of RBVM Task

STS-113/ISS 11A P1 Truss Flight Readiness Review Networks



11A

- Install the P1 Truss
  - Integrated UHF antenna
  - Crew and Equipment Translation Aid (CETA)
- Crew Rotation

Agenda

- **Other SN Supported Launches**
- **Significant Changes**

Ted Sobchak
Network Director
GSFC/Code 450
October 31, 2002

Other SN Supported Launches

- There is one Network supported launch currently planned during the STS-113/11A mission timeframe
  - Atlas II/A TDRS-J launch planned for Nov. 21, 2002 (0336Z-0416Z), STS-113 landing day
  - The SN supports the Atlas vehicle; various ground stations support the TDRS-J spacecraft.
  - No irreconcilable Network resources conflicts have been identified. Specific conflict resolution will continue as needed.
- There are no Network support requirements for the Delta IV launch on Nov. 16.

Significant Changes

- **Mission Support Center (MSC) at GSFC**
  - New equipment has completed testing and has supported two STS/ISS missions in a parallel configuration. The new equipment will be prime.
- **Space Network**
  - TDRS spacecraft East-West station keeping maneuvers.
    - An agreement has been reached with JSC flight dynamics and trajectory to reduce the time periods where these TDRS maneuvers are precluded.
    - The list of prohibited time periods are documented for each mission.
      - STS support may be moved to another TDRS to accommodate an East-West maneuver.
  - The Boeing TDRS-I spacecraft is on-orbit at the test location of 150°W and is currently undergoing acceptance testing. TDRS-I is not available for operation.

Significant Changes

- **NISN**
  - **Single point of failure identified in Wallops to ER radar circuit. Circuit has been routed to a new diverse path.**
  - **One of two redundant Tracking Data System (TDS) units experienced a HW failure pre-launch of STS-112.**
    - **Devices format and route tracking and acquisition data.**
    - **No mission impact.**
    - **Failed unit could not easily be repaired. Failed system was replaced with a development system which was in acceptance testing.**
    - **The developmental system will continue acceptance testing and will remain backup to prime TDS for STS-113.**

Space Communications and Data Systems

Certificate of 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-113 16th ISS Flight (11A) - ITS P1

/s/P.Liebrecht

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

/s/G. Morse

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

/s/K. Reighter

K. Reightler **Date**
CSOC Program Manager

	Presenter: R. Gest
	Organization/Date: Flt Ops/Date:10/31/02

STS-113/11A
Flight Readiness Review
10/31/02

USA Flight Operations

AGENDA

Presenter:
R. Gest

Organization/Date:
Flt Ops/Date:10/31/02

- Facilities Readiness
- Out of Family - None
- Special Topics - None
- CoFR Statement

FACILITIES READINESS

Presenter:
R. Gest

Organization/Date:
Flt Ops/Date:10/31/02

- Anomaly Reports – SPF
  - Software Production Facility (SPF) remote connectivity failure.
    - SPF experienced a remote site connectivity anomaly on 10/22/02. Remote users at JSC, KSC, MSFC, and Boeing could not access the SPF via PC gateway connection.
    - Problem isolated to a Network Communications Processor in B46 at JSC which was recycled and recovered on 10/24.
    - Telnet connection available as backup to connect the JSC users should the problem reoccur.
    - Remote users also have back up manual methods to transfer standard flight production products - not a flight readiness concern.
    - STS-113 Impact: None
      - System fully operational with a work around available if needed.

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:10/31/02

- Anomaly Reports - MCC
  - Trajectory Server failed during STS-112
    - Trajectory server 1 failed during flight day 1 planning shift.
    - Performed select over to Trajectory Server 2.
    - Trajectory Server 3 brought up as a backup.
    - Failure investigation in progress - Testing and troubleshooting of Trajectory Server 1 have not identified the failure cause to date. Two similar signatures occurred previously during simulations over the last 14 months.
    - Trajectory Server 1 was replaced with an identical server from the development area.
    - Flight configuration and rationale:
      - Trajectory Server 3 will be configured as primary and Trajectory Server 1 as secondary.
      - Failure is rare and the fail over to the backup recovers full capability.

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:10/31/02

- Anomaly Reports - MCC (cont'd)
  - Failure to process high-speed tracking test data stream
    - Unable to process high-speed C-band tracking test data during pre-deorbit tracking static interface check.
      - Flt Rules - Data not mandatory if good onboard sensors
      - Post burn retest successful.
    - Subsequent high-speed entry tracking data processed nominally during entry.
    - Problem causes: non-standard tracking network configuration for test and previously unidentified failure mode in Trajectory Server software.
      - Range Operations Control Center (ROCC) provided the same C-band source as both best and 2nd best sources – non standard for normal ops but acceptable for test.
      - Navigation software incorrectly rejected all high-speed C-band tracking test data because of same source duplication - should have flagged and processed.
      - Console procedures did not cover trajectory server software inability to handle this test config - not seen during previous flights, sims or tests.

FACILITIES READINESS

Presenter:
R. Gest

Organization/Date:
Flt Ops/Date:10/31/02

- Anomaly Reports - MCC (cont'd)
  - Failure to process high-speed tracking test data stream (cont'd)
    - Will coordinate with ROCC personnel to avoid this configuration for future checks.
    - MCC Navigation operators are trained on recognition of this non-standard configuration signature for STS-113.
    - Console procedures for non-standard ROCC configuration will be in place for STS-113.
      - If non standard ROCC configuration reoccurs, Navigation operator will contact the ROCC to change the configuration in real-time.
    - The Trajectory Server software will be updated for STS-115 to generate an error message for this configuration and to allow the data to be processed.

FACILITIES READINESS

Presenter:
R. Gest
Organization/Date:
Flt Ops/Date:10/31/02

- Significant Changes – MCC
  - Trajectory Server Software Release – Version 6
    - Version 6 released 4/10/02
      - 40 Major AR's corrected
      - 125 Minor AR's corrected
      - 6 SR's implemented
    - Shelf-life summary
      - 168 hours testing
      - 161 hours of user comp time
      - 552 hours of simulations
    - Flight critical certifications obtained for applicable processors
    - Trajectory Server is ready to support STS-113/11A

STS-113/11A Certification of Flight Readiness	Presenter: R. Gest Organization/Date: Flt Ops/Date:10/31/02

- 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-113/11A MISSION

C.Knarr
Associate Program Manager, Flight Operations

MISSION OPERATIONS DIRECTORATE
SHUTTLE CERTIFICATE OF FLIGHT READINESS (CoFR)
FLIGHT: STS-113/11A 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	DA8/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	FOR RICHARD FITTS 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	FOR 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	for 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	for 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, Shuttle, GSFC
	Mission Operations Director

MISSION OPERATIONS DIRECTORATE
ISS CERTIFICATE OF FLIGHT READINESS (CoFR)
STS-113/11A REQUIREMENTS

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	DA8/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, SSP-ISSP, GSFC
	Mission Operations Director

STS-113/11A 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-113/11A.

Robert E. Castle
MISSION OPERATIONS DIRECTOR