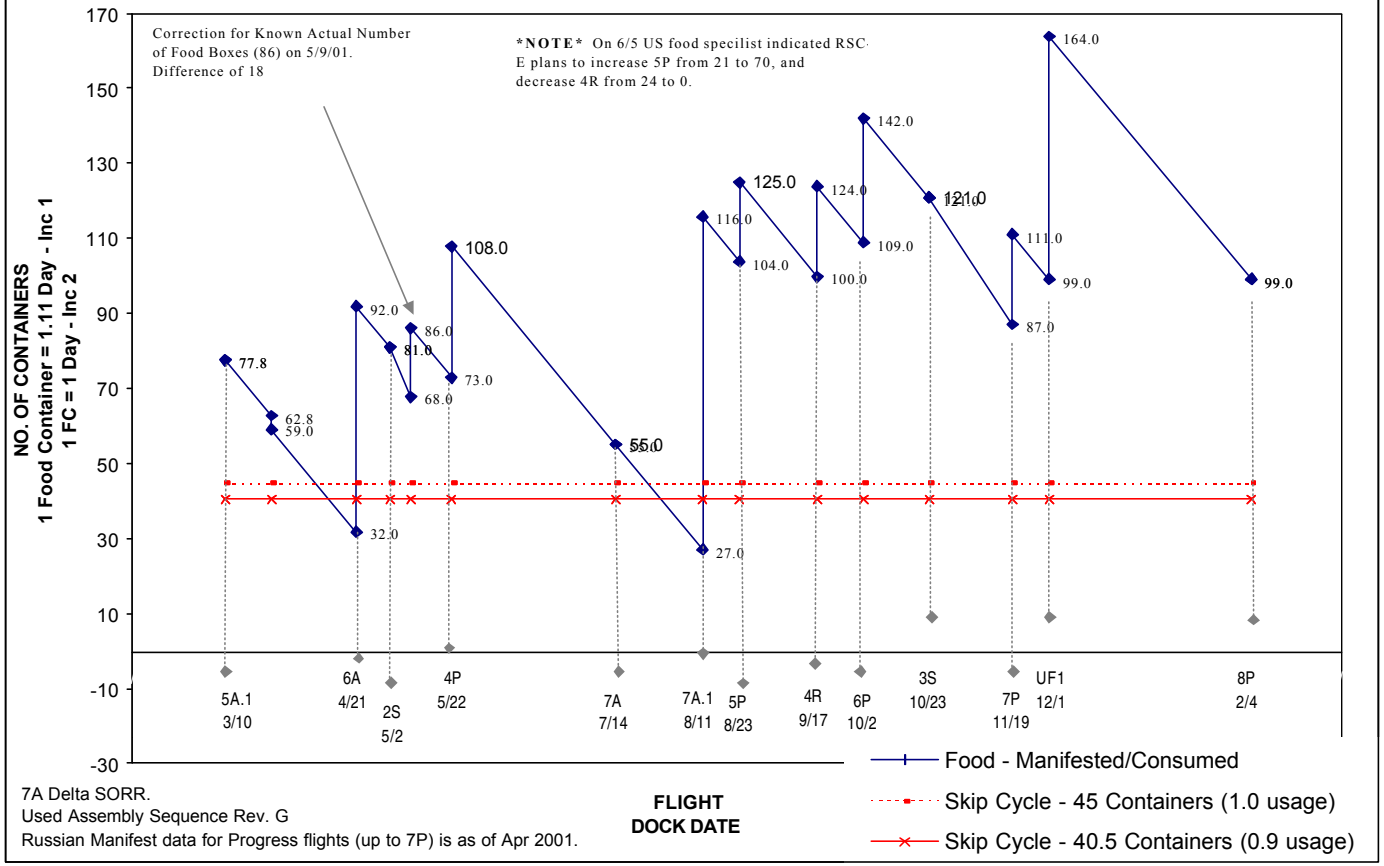
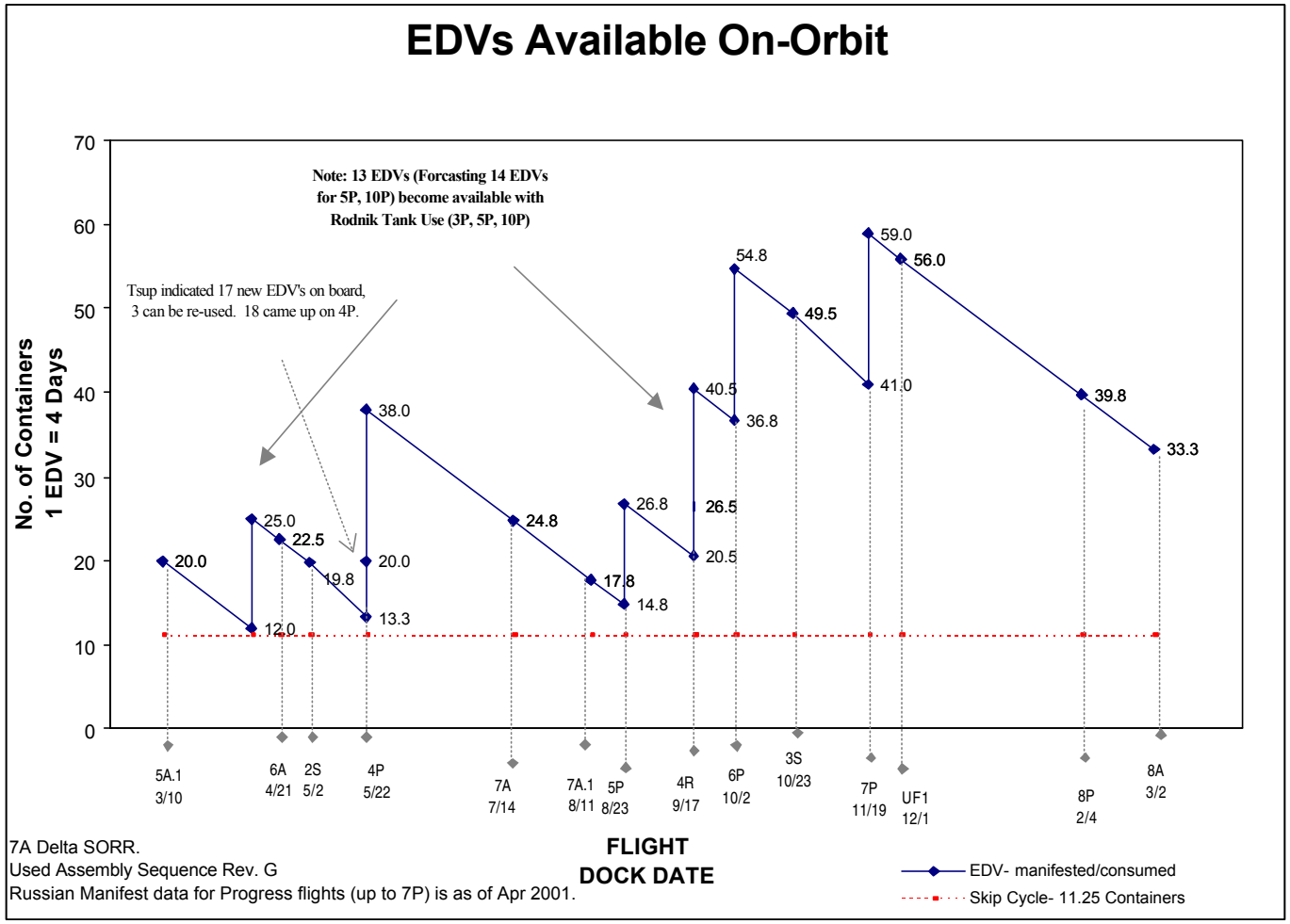
BACKUP CHARTS

American & Russian Food Containers Available On-Orbit

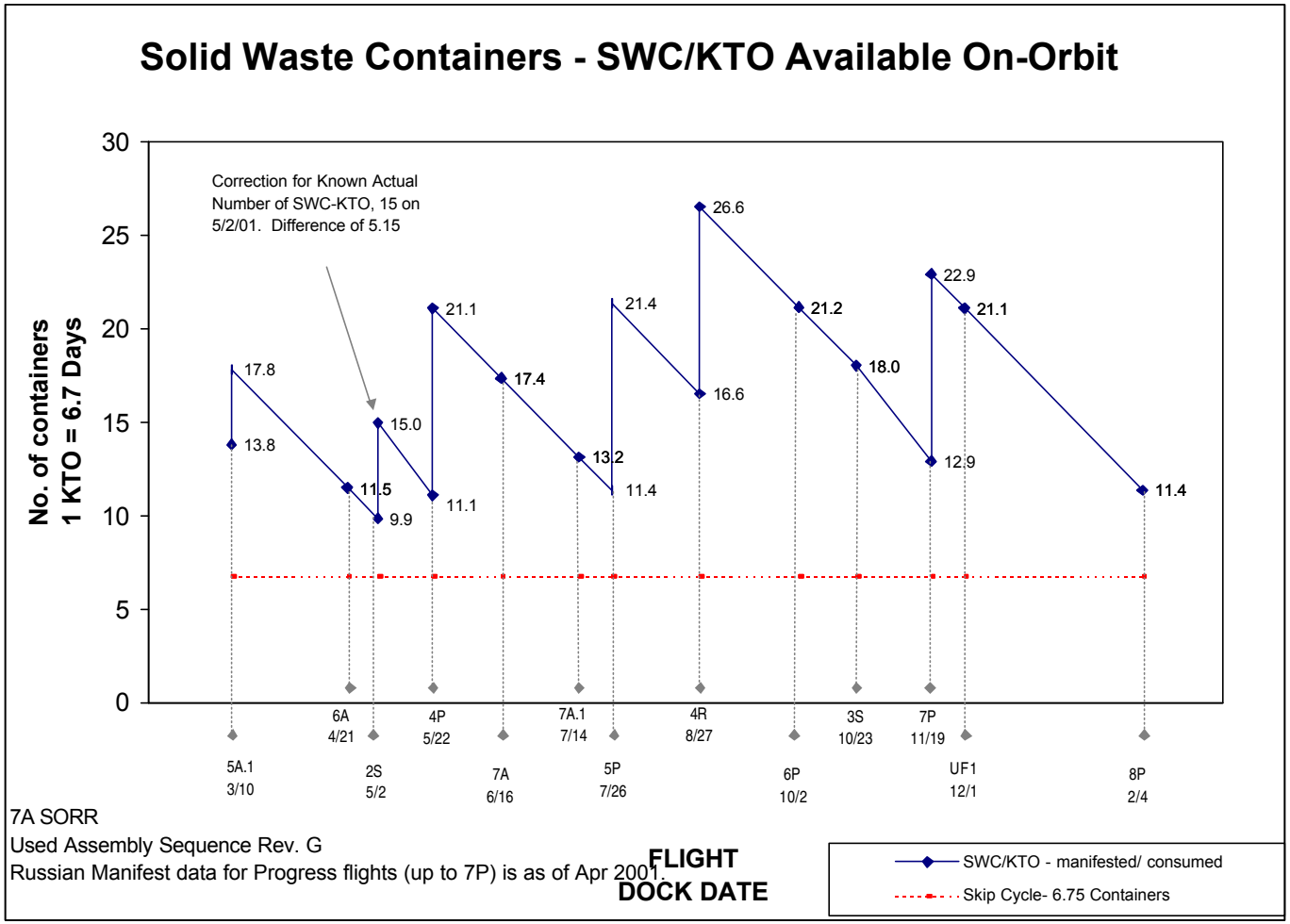


7A Delta SORR.
Used Assembly Sequence Rev. G
Russian Manifest data for Progress flights (up to 7P) is as of Apr 2001.

EDVs Available On-Orbit



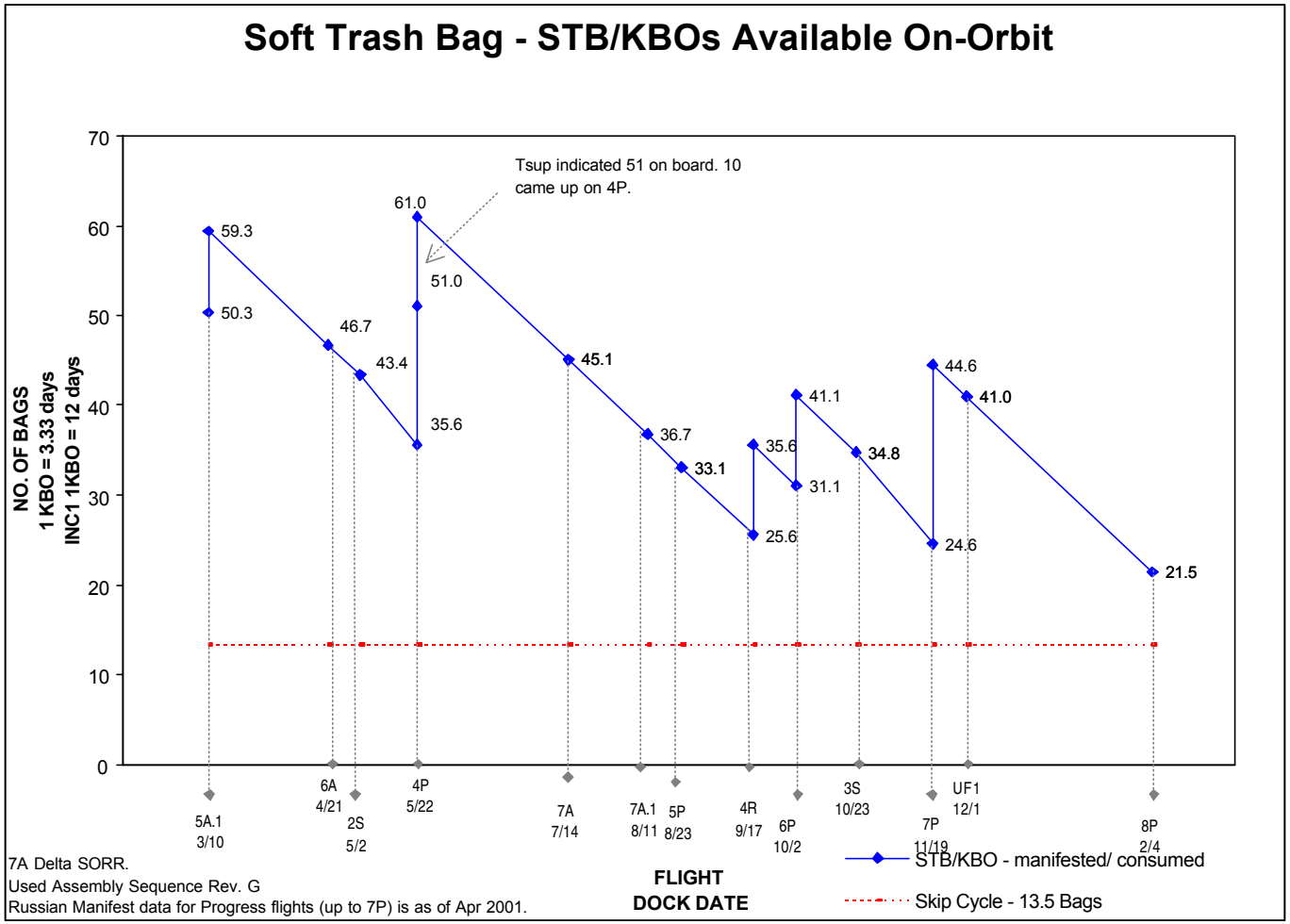
7A Delta SORR.
Used Assembly Sequence Rev. G
Russian Manifest data for Progress flights (up to 7P) is as of Apr 2001.

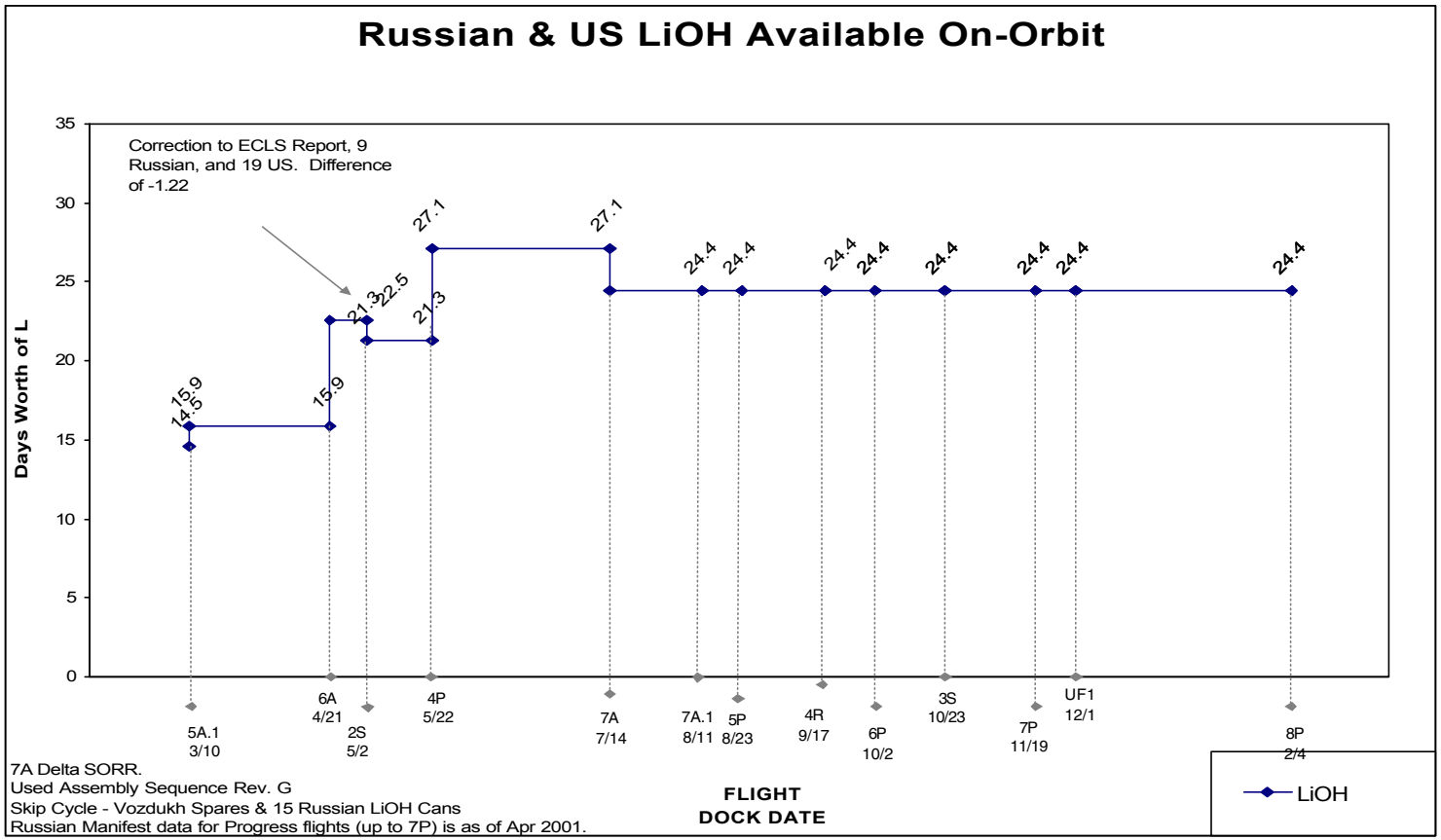


7A SORR

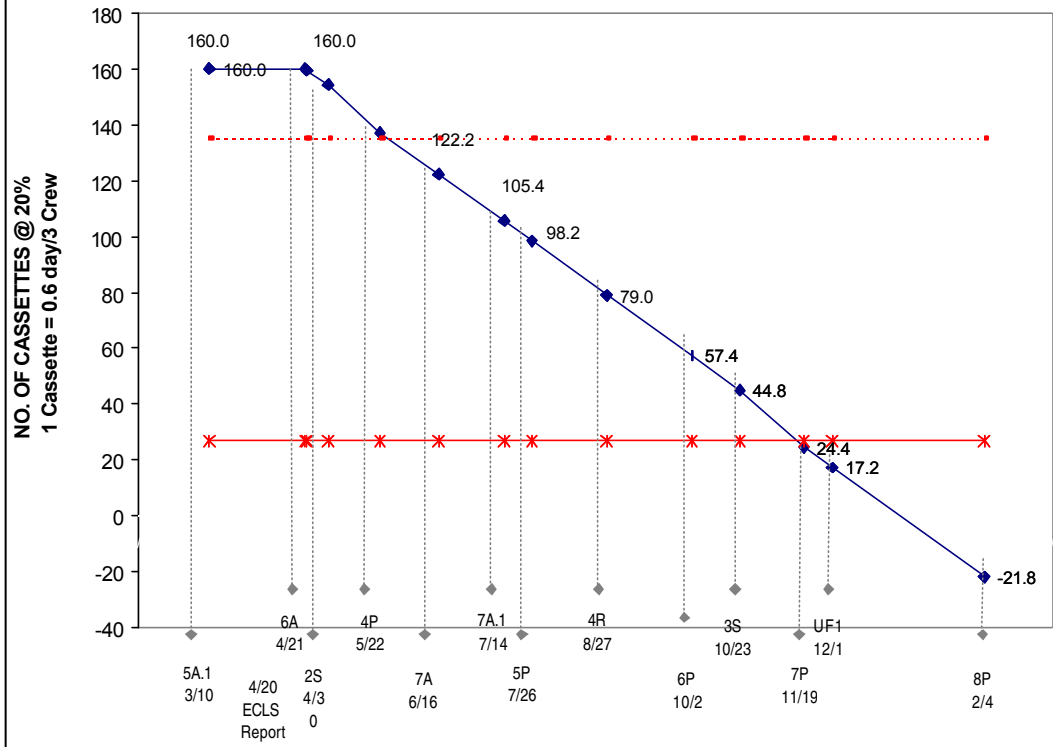
Used Assembly Sequence Rev. G

Russian Manifest data for Progress flights (up to 7P) is as of Apr 2001.


Soft Trash Bag - STB/KBOs Available On-Orbit
NO. OF BAGS
1 KBO = 3.33 days
INC1 1KBO = 12 days
70
60
50
40
30
20
10
0
Tsup indicated 51 on board. 10 came up on 4P.
59.3
50.3
46.7
43.4
61.0
51.0
35.6
45.1
36.7
33.1
35.6
25.6
41.1
31.1
34.8
44.6
24.6
41.0
21.5
5A.1 3/10
6A 4/21
2S 5/2
4P 5/22
7A 7/14
7A.1 8/11
5P 8/23
4R 9/17
6P 10/2
3S 10/23
7P 11/19
UF1 12/1
8P 2/4
FLIGHT
DOCK DATE
STB/KBO - manifested/ consumed
Skip Cycle - 13.5 Bags
7A Delta SORR.
Used Assembly Sequence Rev. G
Russian Manifest data for Progress flights (up to 7P) is as of Apr 2001.


Russian & US LiOH Available On-Orbit
Correction to ECLS Report, 9 Russian, and 19 US. Difference of -1.22
Days Worth of L
35
30
25
20
15
10
5
0
14.5
15.9
15.9
21.3
22.5
21.3
27.1
27.1
24.4
24.4
24.4
24.4
24.4
24.4
24.4
24.4
5A.1 3/10
6A 4/21
2S 5/2
4P 5/22
7A 7/14
7A.1 8/11
5P 8/23
4R 9/17
6P 10/2
3S 10/23
7P 11/19
UF1 12/1
8P 2/4
FLIGHT DOCK DATE
LiOH
7A Delta SORR.
Used Assembly Sequence Rev. G
Skip Cycle - Vozdukh Spares & 15 Russian LiOH Cans
Russian Manifest data for Progress flights (up to 7P) is as of Apr 2001.

SFOG (Oxygen) Cassettes Available On-Orbit



Oxygen - manifested/ consumed

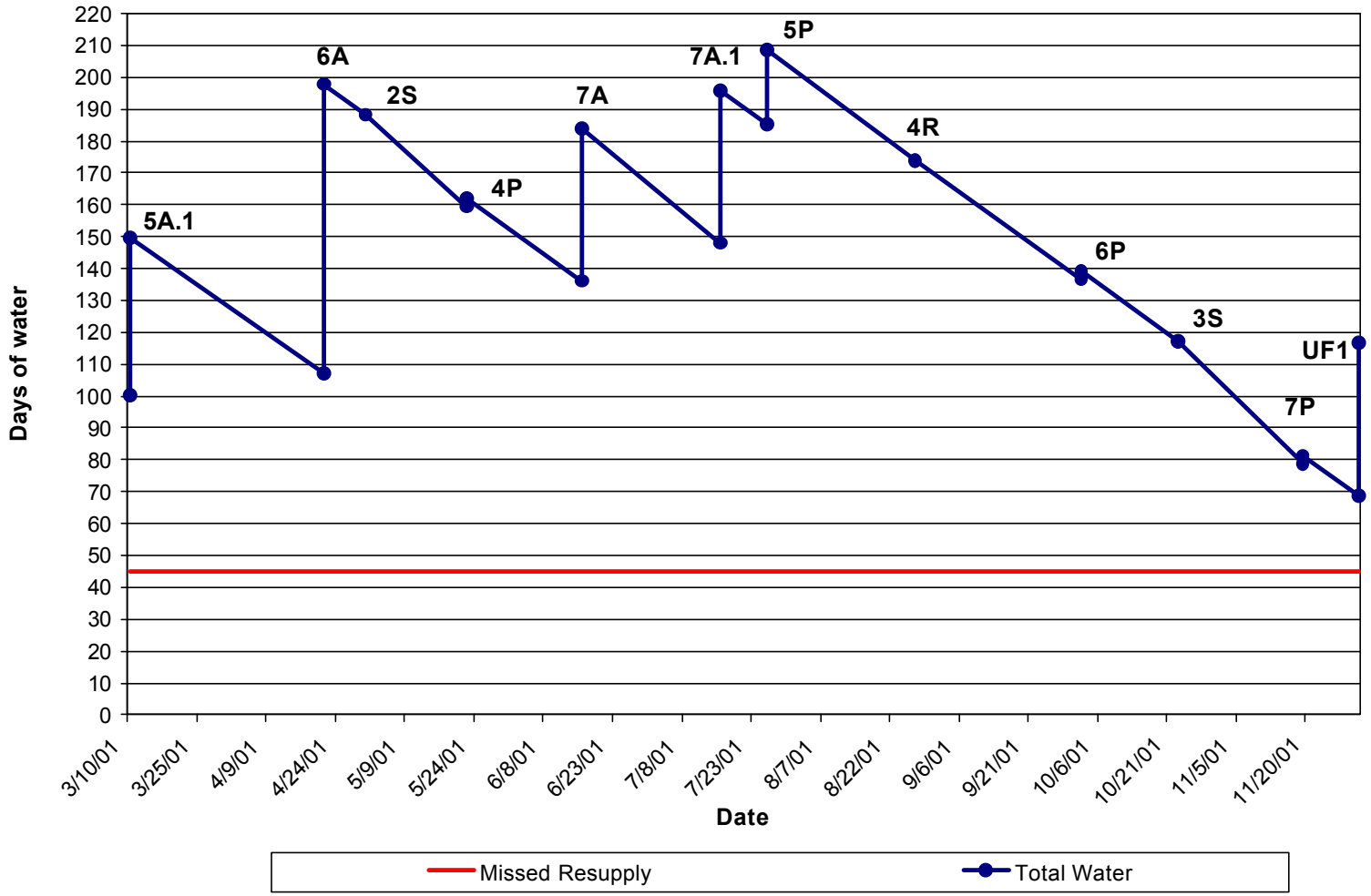
Skip Cycle at full usage (45 days) - 135 Cassettes

Skip Cycle for maintenance protection (20% of 45 days) - 27 Cassettes

NOTE: Consumed qty/time represents Elektron down for maintenance and/or high beta angles. NOT for failure.

7A SORR
Used Assembly Sequence Rev. G
Russian Manifest data for Progress flights (up to 7P) is as of Apr 2001

Days of water on-orbit



John Halligan - OM/VIPeR

ISS Configuration Management Office

7A FLIGHT READINESS REVIEW

OL/Alan Lindenmoyer
Manager, Configuration Management

Date 06/26/01

7A Approved Waivers

CHANGE ID	TITLE	CHANGE APPROVAL	REMARKS	FLIGHT EFFECTIVITY
SSCN 2873	Request for Waiver: to SSP 30237 paragraph 3.2.2.2, CS02, Conducted Susceptibility	VSIP 05/23/00	This CR request submittal of waiver BCP-W-0017 to the customer for a contractual non-compliant condition against the RPCM part number R077417-31, serial number C024154. Acceptance test was conducted on the unit. Modification to this specific unit not completed due to installation into airlock rack that is buried.	7A & ON
SSCN 3121	Waiver Requests for Airlock System 1 (ALSYS1) Computer Software Configuration Item (CSCI)	ASCP -OSB 04/18/00	Waiver of ALSYS1 CSCI software requirements spec S683-70743, Rev G, requirements. The three (3) requirements not met are: 1.) ALSYS1 SRS requirement AL1B5-18 (Develop to standards contained in D684-10056-1) 2.) ALSYS1 SRS requirement AL1MUE-48 (Reconfigure sensors on command) 3.) ALSYS1 SRS requirement AL1MUE-52 (reconfigure effectors on command	7A & ON
SSCN 4589	Request for Waiver: Secondary Power Bus Nicked Wire Repair	VSIP 05/24/01	A crimp type terminal splice repair configuration has been incorporated into Secondary Power Bus A3 / B1 Wire Harness (Equipment Lock). Serial Number(s) Affected: 000001	7A & ON
SSCN 5264R1	Request for Waiver –Insufficient Configuration Accounting System Reconciliation Data for the Joint Airlock	VSIP 05/24/01	Due to insufficient as-designed/as-built configuration data element Boeing is unable to completely satisfy detailed hardware configuration accounting requirements in SSP 41170.	7A & ON
SSCN 5536R1	Request for Waiver – Deficient Configuration Accounting System Reconciliation Data / 7A Mission	VCB 05/31/01	Boeing is unable to verify traceability in relation to the installed hardware to its as-designed requirements due to deficient as-built data recording. This results in a lost traceability condition for this hardware. Serialization for these components has been determined to be low risk to the Program with KSC MERB concurrence	7A & ON

7A Approved Waivers

CHANGE ID	TITLE	CHANGE APPROVAL	REMARKS	FLIGHT EFFECTIVITY
SSCN 5537R1	Request for Waiver – Configuration Accounting System Reconciliation Deficiencies due to Part Substitution / 7A Mission	VCB 05/24/01	Substitution of hardware during the build/assembly phase of Airlock processing has resulted in a non-conforming condition to the design baseline. Alternate parts used because required parts not available to meet launch schedule.	7A & ON
SSCN 5544	Request for Waiver – Insufficient Configuration Accounting System Reconciliation Data for Tube Assembly 683-423762 used on the Joint Airlock.	VCB 05/31/01	Boeing is unable to satisfy detailed hardware configuration accounting requirements in SSP 41170 because of the loss of an Integrated Record System Shop Order (IRSO 683-42376-2 / MAX ID 365947F) and is consequently seeking relief of this data requirement for this hardware by means of a data waiver	7A & ON
SSCN 5575	Request for Waiver – Configuration Accounting System Reconciliation Deficiencies Due to Uninstalled Parts/7A Mission	VCB 05/24/01	Labels were not installed during the build/assembly phase of Airlock processing which has resulted in a non-conforming condition to the design baseline.	7A & ON
SSCN 5582	Request for Waiver – Part Substitution of Scuff Plate Fasteners	VCB 05/29/01	During installation of scuff plate, four NAS1581-1C4R7 fasteners were used in place of four NAS1994T6T fasteners	7A & ON
SSCN 5583	Request for Waiver – Additional Clamp Added to the Integrated Hose Assembly /7A Mission	VCB 05/29/01	Clearances may be obtained by loosening the oxygen flex hose fittings and rotating the flex hose, but the integrity of the system would be in question unless leak and functionality testing were performed.	7A & ON
SSCN 5584	Request for Waiver – Lost Traceability of Beta Cloth Panel	VCB 05/29/01	Serial Number traceability was lost as to which panel was reworked. Rework and Use-as-Is rationale were approved by the MERB per PR001272 24/05/01	7A & ON
SSCN 5597	Request for Waiver – Lost Traceability of Discarded MLI	VCB 05/31/01	During the build/assembly phase of Airlock Processing, four MLI assemblies, 683-52248-3, were removed and discarded. There is no longer a requirement for the removed MLI blankets. During removal the serial numbers were not recorded because the serial number is not printed on the MLI. Per the drawing, the serial number is on a parts tag included with the part at original installation. At that time the s/n was recorded and the tag was removed.	7A & ON

7A Approved Waivers

CHANGE ID	TITLE	CHANGE APPROVAL	REMARKS	FLIGHT EFFECTIVITY
SSCN 5598	Request for Waiver – Uninstalled Parts (C02 Removal Rails) /7A Mission	VCB 05/31/01	The parts list for the Cabin Air Rack calls for (2ea) C02 Removal Rails, 683-52009-26 PL "F". No paper can be found that shows these rails installed or built. Boeing Configuration Management is unable to completely satisfy the As-Designed Vs. As-Built configuration accounting requirements in SSP 41170, paragraph 3.5.4.	7A & ON
SSCN 5604	Request for Waiver – Part Substitution of Viton O-Ring for Silicone	VCB 06/06/01	O-ring replacement from Viton (M83248/1) to Silicone O-ring (2-010S0383) was not accomplished at 2 locations as required by drawing 683-52016 PL E for the Crewlock side of the Airlock hatch. Will not affect form, fit, or function.	7A & ON
SSCN 5610	Request for Waiver – Lost Traceability of Vent Port Assembly	VCB 06/07/01	During hardware rework, serialization of the 683-51981-12 Vent Port Assembly was inadvertently omitted. Design called for serialization. This lost serialization of this part will not affect form, fit or function of the installation.	7A & ON
SSCN 5619	Dash Number Waiver for ISS Airlock Umbilical Interface Assembly (UIA)	SSPCB 06/25/01	This CR waives the requirement to roll the dash number on the ISS airlock UIA for incorporating hardware modifications that were approved per CR 5511 changing an electrical connector O-ring.	7A & ON
SSCN 5646	Request for Waiver –Insufficient Configuration Accounting System Reconciliation Data for Joint Airlock Valves, Bracket and Pin Bolts	SSPCB 06/15/01	Boeing is unable to completely satisfy applicable configuration reconciliation requirements due to insufficient as-designed/as-built system reconciliation data. This waiver request addresses those items defined in the following attachments. For these items, Boeing will continue to obtain the data elements to the extent possible. Attachment 1 "Problem Type Matrix" Attachment 2 "Rationale" Attachment 3 "Un-reconciled Data" Attachment 4 "DD-1694 Waiver/Deviation Form"	7A & ON

7A Approved Exceptions

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 1200	Exception to SSP 41172: Accelerated Burn-in of ISS Airlock Servicing & Performance Checkout Equipment	T&VCP 04/14/98	Combination of room temp plus accelerated burn-in hours have the potential to reduce test time allowing earlier shipment of hardware in support of the ISS
SSCN 1348	Exception to SSP 41172: Thermal Cycle Testing of ISS Airlock Servicing & Performance Checkout Equipment (SPCE) Battery Charger Assembly	T&VCP 06/22/98	The Servicing & Performance Checkout Equipment (SPCE) battery charger assembly contains commercial components and a lithium battery (with an upper temperature "safe" cutoff) which prevents proper operation of the hardware for the full range as specified in the paragraphs for thermal cycle testing.
SSCN 1595	Exception to SSP 41172: Russian Depressurization Pump Power Cable	T&VCP 09/25/98	Russian supplied power cable does not have proper interface with ISS airlock remote power controller, GFE junction box will be attached to power cable for proper interface provisions
SSCN 3057	Airlock PIDS Exceptions to Fasteners, paragraph 3.3.12.6 and Connectors, paragraph 3.3.12.8	VSIP 07/26/00	Modify PIDS to allow for exceptions to the tool actuated fastener clearance requirements
SSCN 3338	Revise Airlock Acoustic Requirement Exception	SSPCB 12/05/00	Revise airlock acoustic requirements to accommodate the Russian depress pump and ORCA noise exceedances
SSCN 3395	Airlock Translation Path Exception & Airlock PIDS Exceptions to Paragraph 3.3.7.1.1, Anthropometric Requirements	VSIP 05/01/01	Purpose of this CR is to obtain ISS organization approval to provide an exception to USOS 3.2.2.4d, establish translation paths, for an interference from a NODE 1 trunion pin to an airlock secondary translation path
SSCN 3516	US Lab and Airlock Exceptions to PIDS paragraph 3.3.7.1.7 Controls and Displays for EELPS	VSIP 01/04/01	Add exceptions to USL and A/L PIDS Controls and Displays requirement 3.3.7.1.7. (NASA approved, will also need ASI signature for Node 2)
SSCN 3655	Exceptions to SSP 41172 for O2/N2 Pressure Sensor	T&VCP 11/29/00	Request for exceptions to specific requirements of SSP 41172 for the specified item.
SSCN 3781	Exception for Airlock CVIU differential circuits	ASCB 08/07/00	Exception to airlock PIDS S684-10142 and SSP 50002
SSCN 3825	Exceptions to SSP 41172: Qualification and Acceptance Random Vibration and Qualification Thermal Cycle Testing for Latching Motor Valve (LMV)	T&VCP 11/08/00	Request for exceptions to specific requirements of SSP 41172 for latching motor valve

7A Approved Exceptions

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 3877	Exception to SSP 41172 for O2/N2 Low Pressure Regulator/Relief Valve and O2 Med. Pressure Regulator/Relief Valve	T&VCP 04/30/01	Qualification and acceptance testing of the O2/N2 Low Pressure Regulator/Relief Valve and the O2 Med. Pressure Regulator/Relief Valve has been completed. The testing performed, as part of the qualification and acceptance test programs does not fully comply with the requirements contained in the SSP 41172 environmental test requirements document
SSCN 4309	Exceptions to SSP 41172: Qualification Thermal Cycle Testing for the Power Supply Assy and Umbilical Interface Assy	T&VCP/OSB 04/10/01	Revise SSP 41172E, para 4.2.3.3 B as specified in CR
SSCN 4457	Request Exception to SSP 41172 for the Metal Oxide (Metox) Program	T&VCP 04/30/01	Request exception for the controller on the Metox Regenerator, P/N SV821750-2 in the following areas: -Paragraph 4.2.2.3 B, Thermal Cycling Test, Component Qualification Testing, Temperature -Paragraph 4.2.2.3 C, Thermal Cycling Test, Component Qualification Testing, Duration -Paragraph 4.2.2.4, Supplementary Qualification Requirements -Paragraph 5.1.3.3 B, Thermal Cycling Test, Component Acceptance Testing, Temperature -Paragraph 5.1.3.3 C, Thermal Cycling Test, Component Acceptance Testing, Duration -Paragraph 4.2.2.5, Depress/Repress Vacuum Requirement (Survivability) -Paragraph 5.1.8.3 B, Burn In Test, Component Acceptance
SSCN 4647	Exception To SSP 41172: Qualification Thermal Vacuum Tests for the Spacelab Logistics Pallet (SLP) High Pressure Gas ORU Adapter	T&VCP 01/24/01	Boeing-Huntsville has completed qualification and acceptance testing on the SLP HPG Adapter Assembly. The Thermal Vacuum Acceptance testing performed did not fully comply with the requirements contained in the SSP 41172 requirement document.
SSCN 4820	Airlock Rack Labeling Exceptions to PIDS	VSIP 01/23/01	Add label exception to the airlock PIDS S684-10142G

7A Approved Exceptions

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 5051	Exception to Airlock Air Velocity Requirement	VSIP 04/19/01	Expand the Airlock ambient air velocity requirement to allow a greater range of velocities (remaining within envelope of nominal human comfort) - exception to S684-10142 (Airlock PIDS) as follows: Add to paragraph 3.2.1.13: "The Airlock air velocities are excepted to 15-70 fpm instead of 15-40 fpm. This exception may be applied for all Airlock operations, or may only be invoked when other atmospheric conditions (temperature, dew point) warrant an increase in air flow through the heat removal equipment." [Note: Requirement traceability is from Segment Spec (SSP 41163, Paragraph 3.2.1.1.1.7a) and System Spec (SSP 41000, Paragraph 3.2.1.1.1.2d)]
SSCN 5242	Request for Exception Airlock/Node 1 Atmosphere Control Supply (ACS) Line Condensation and Module Interface Gas Temp Non-Compliance	VSIP 05/04/01	Airlock and Node 1 PIDS requirements (3.3.14) will be changed to take exception to current condensation requirements for the ACS O2 and N2 supply lines (low and high pressure in Airlock and low pressure in Node1), structure in contact with these lines and for pneumatic components in these systems. Exception will also be taken to this requirement for the coolant lines within the Umbilical Interface Assembly (UIA). This SSCN will authorize implementation of ICD PIRNs for module to module ACS low pressure gas supply interface temps (Airlock to Node 1, Node 1 to Lab, and Node 1 to Node 3) and ICD PIRNs for Umbilical Interface Assembly (UIA) and Portable Breathing Apparatus (PBA) supply interface temps.
SSCN 5271	Exception to SSP 41172 for the Pre-breathe Hose Assembly (PHA)	T&VCP 04/30/01	Request exception to the 100 ms O2 compatibility requirement for the PHA hardware.

7A Approved Exceptions

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 5529	Exceptions to Electromagnetic Effects (EME) Requirements for SSP 30237	T&VCP 05/16/01	This change will incorporate approved EME requirements exceptions initiated by Boeing development sites, NASA GFE, and the Payload Community via the EME Panel. Exceptions are included in the attached TIA's: 0347, 0265, 0368, 0369, 0370 Baseline Documents Affected SSP 30237: Rev E: Space Station Electromagnetic Emission and Susceptibilit Requirements SSP 30243: Rev E: Space Station Requirements for Electromagnetic Compatibility SSP 30245: Rev E: Space Station Electrical Bonding Requirements **(Need ASI signature)**

7A Pending Exceptions

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 5585	Exception to SSP 30233 Requirements for Dielectric Withstanding Voltage (DWV) Test of Russian Depress Pump Cables	VSIP Pending	SSP 30233, Para 4.6.3 requires interconnecting cables, harnesses, and wiring to be assembled or installed to meet the requirements of NHB 5300.4(3G). The Houston T & V board has interpreted this to require that all power cables will be tested to this requirement. This change is to eliminate the requirement for the following cables W13211812-100: Provides data/control from DPA EU to/from DPA pump W23211812-200: Provides Power from DPA EU to DPA pump SEG33110830-301: Interfaces power AL RPCM type II to DPA EU SEG33110827-801, W4: Interfaces AL MDM to DPA EU for command control SEG33110827-801, W5: Interfaces AL MDM to DPA EU for telemetry data

7A Pending Changes

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 5327	Update SSP 54102-ANX-4, Increment Definition Requirements Document (IDRD) for Planning Period 2 (PP2) Annex 4: Medical Operations	MIOCB Pending	This CR is to request review and approval of updates made to the Baseline IDRD for PP2 Annex 4: Medical Operations. These updates reflect lessons learned during Increment 1, delete activities that will not be performed by the US or Russian crewmembers, adds contingency activity procedures not currently planned to be scheduled and adds Increment 2 specific equipment checkout and activation procedures.
SSCN 5379	Revise to Revision A, SSP 57126-A0-1-4, Addendum to the Payload Integration Agreement for the Protein Crystal Growth – Enhanced Gaseous Nitrogen Dewar for Increments 0, 1, and 4.	PCB Pending	Develop revision of the document to include flights 7A and 7A.1 and incorporate changes to tables to eliminate numerous change bars resulting from DCNs.
SSCN 5557	New ISS Console: CIO (Cargo and Integration Officer)	MIOCB Pending	The Flight Director Office has requested a new console position, CIO, to assume responsibility for ISS integrated tasks and products. The major tasks include SSC Ops Lan planning and trouble-shooting, inventory and location planning for next day ops, real time crew communications for inventory and stowage queries, IMC interface, the plug-in-plan and the ISS Wireless Instrumentation System (IWIS). Console products include daily procedure and location lists for the ISS crew, plug-in-plans, flight notes for IMS, IWIS, SSC trouble-shooting procedures, IMC interface and CHIT responses.
SSCN 5562	Re-Certification of RFDB	ASCB Pending	Perform a delta cert to permit the RFPDB to remain on orbit as a power distribution outlet in the ISS.
SSCN 5636	Revise Ascent/Descent flight information in NOTE to Table 8.1-1, Payload Provided Flight Hardware, Page 8-1.	PCB Pending	Change wording in the note with table 8.1-1 Payload-Provided Flight Hardware, which lists ascent/descent flights for jaz cartridges.
SSCN 5689	Update SSP54102-7A Rev A, Increment Definition and Requirements Document (IDRD) for Planning Period 2 (PP2), Annex 1: Station Manifest, Flight 7A, STS-104 for L-1 Month Manifest Decisions	MIOCB Pending	Update Manifest for Flight 7AS

7A CM SORR Open Work

ITEM ID	TITLE/DESCRIPTION	PLAN TO RESOLVE/CLOSE	RESPONSIBLE ORGANIZATION/ ACTIONEE	ECD	RISK TO FLIGHT
7A-CM-S-001	MANIFEST ACCOUNTING ACTIVITIES AND DOCUMENTATION	COMPLETE VERIFICATION	BOEING-KSC/S. TOWNSEND	L-2	LOW
7A-CM-S-002	AS-DESIGN/AS-BUILT RECONCILIATION OF HARDWARE/SOFTWARE	COMPLETE VERIFICATION	BOEING/L. THOMPSON PGOC/S. TOWNSEND	06/26/01	LOW
7A-CM-S-003	VERIFICATION OF ISS ON-ORBIT CONFIGURATION	DISPOSITION THE OPEN ITEMS	BOEING-KSC/S. TOWNSEND	06/26/01	LOW
7A-CM-S-004	7A SORR ACTIONS: 2 OPEN 7A DELTA SORR ACTIONS: 6 OPEN	VALIDATE THE DISPOSITION OF OPEN ACTIONS	OL/LEASA BUTLER	06/26/01	LOW

7A CoFR Certification Results

- All 7A approved changes since CoFR including waivers, deviations, and exceptions, have been identified and incorporated. (except as noted).
- The 7A as-built configuration has been reconciled with the as-designed baseline (except as noted).
- 7A open work has been identified and will be tracked to closure.

BACK - UP

7A Approved Changes

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 4375	New PCS Project GFE/GFD J2 List Deliverables	SSPCB 05/16/01	Add PCS CSCI DFE deliverables to the J2 list for delivery to the Boeing prime MBF
SSCN 4741	Update Airlock Baseline Design to Reflect the As-Built Configuration	VSIP 05/15/01	This is a Make Operable change to the following Airlock Baseline Drawings to incorporate remaining baseline design changes into the drawings:
SSCN 5052	Portable Fire Extinguisher (PFE) Cover Added to PFE Drawings	VSIP OSB 05/21/01	Modify PFE cover drawing 33112741-301 to include drawing of PFE with cover on, and instructions on cover installation (Moved from 5A.1 to 6A to 7A)
SSCN 5458R1	Revise SCD 683-15179C to include Transient High Flow Rate Requirements	VSIP 05/22/01	Revise Table III, Quick Disconnect performance requirements to include Transient High Flow Rate Requirement of 18.15 LBM/Min. Existing QDs have been qualified to the transient flow rates. The existing specification includes only the steady state requirements
SSCN 5492	Update SSP54102-07A, Increment Definition and Requirements Document (IDRD), for Planning Period 2 (PP2), Annex 1: Station Manifest, Flight 7A (STS-104) for Bench Review Preparation	MIOCB 05/11/01	Update the 7A manifest (APPROVED BY NASA, NEED CSA/RSA SIGNATURES)
SSCN 5511	Replace ISS Airlock Umbilical Interface Assembly (UIA) Electrical Connector Guard O-Seal	SSPCB 06/25/01	This CR: 1. Replaces the ISS Airlock umbilical interface assembly (UIA) electrical connector guard O-seal with a slightly longer O-seal in order to prevent excessive stretching of the O-seal. A UIA subassembly drawing will be updated to reflect the O-seal change. 2. Allows the use of the UIA bacteria cartridge without betadine (antibacterial film) as an acceptable alternate item within the UIA while the Shuttle Program phases out the present bacteria cartridge which utilizes betadine. 3. Requests that the dash number of the UIA not change due to these modifications. (this has been disapproved by CM)
SSCN 5546	Station Program Notes for ASCB Approval – May 18, 2001	ASCB 05/18/01	This is not a change to any documents or code. ASCB approval is being sought to notify all affected parties of the Station Program Notes (SPNs). Station Program Notes are used to document operational limitations of flight software releases and to identify the need to modify OPS procedures, as applicable, to be consistent with the existing constraints of the software until the next release of the software has occurred. JSRP

7A Approved Changes

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 5538	Pin Bushing Launch Restraint	MERB 05/15/01	A strap, as defined in new drawing 683-52227, will be added to restrain the pin bushing of the "X" Constraint Bracket Assembly (683-52171-5) during launch. Drawings 683-52171 and 683-52233 shall be revised to show the restraining strap installation. Drawing 683-52197 shall be revised to define the removal of the straps. Thermal tape shall be applied to the pin bushings of bracket assemblies 683-52171-5 and –6.
SSCN 5542	Update SSP 54102 IDRD PP2 to reflect changes in Stage 6A requirements	SSCB/OSB 06/12/01	This change will update the Stage 6A portion of the document
SSCN 5543	Update SSP 54102 IDRD PP2 to reflect recent changes in the Flight 7A and Stage 7A requirements and other cleanup items.	SSCB/OSB 06/01/01	This change will update the Increment 2 portion of the document, concentrating mainly on the Flight 7A and Stage 7A requirements (Need CSA & RSA signatures)
SSCN 5555	Update Airlock Product Baseline to Incorporate Wireless Information System (WIS) Installation	VSIP 05/18/01	The collector drawing 683-52198 needs to be updated to incorporate the –325 installation of the MICRO- WIS.
SSCN 5578	Expedition 2 Crew Request Herb Garden Liquid Fertilizer for Flight 7A	GCB/OSB 05/31/01	Engineering is requested to prepare documentation to support packaging and providing crew requested liquid fertilizer for the Expedition 2 Herb Garden. The fertilizer is from a safety-approved payload. Fertilizer will be packed in the already certified empty beverage pouch. The part number for the empty beverage pouch is SDD48101683-001. The adapter assembly that gets sealed in the top of the package is SED48101796-301. The pouch is a laminate of polyester; aluminum foil and polyethylene (outside to inside). This is a Materials Only certification. Engineering is to work with the food office/V. Kloeris/SF in packaging the fertilizer. Engineering shall provide the proper level of leak protection with ziplock bags. 3 units of fertilizer are to be provided to USA/FCE to be packed by CB (Wendy Lawrence) in a Crew Provisioning cargo transfer bag by 5/25/01. The fertilizer shall be properly labeled that it is fertilizer.
SSCN 5580	Update SSP54102-7A Rev A, Increment Definition and Requirements Document (IDRD) for Planning Period 2 (PP2), Annex 1: Station Manifest, Flight 7A, STS-104 to Incorporate Post-Bench Review Changes	MIOCB 05/31/01	Update Flight 7A manifest

7A Approved Changes

CHANGE ID	TITLE	CHANGE AUTH	REMARKS
SSCN 5606	Launch Date Changes for 7A and 7A.1	SSPCB 06/11/01	This change updates the following launch dates 7A – change from 06/14/01 to NET 07/02/01 7A.1 – change from 07/12/01 to NET 08/05/01 This CR for planning NASA scheduling and planning purposes only. Actual lauch dates will be relected in the next updates to SSP 50110, MIM, SSP 54102, IDRD for PP2 and SSP 54103, IDRD for PP3
SSCN 5630	HPG Tank ORU Support Structure Assembly	MERB 06/08/01	Apply thermal control tape, Permacel P-213, to bracket assemblies 683-52171-1, -2, -5, -6, -7 and –8 as described on FEC-Airlock-032.

Backup

IFI Summary

- MER-00354 - Multiple MSS Cameras Routed to the Same Video Line
- MER-00382 - Latching End Effector Temperature Ground Display 60 Deg Higher than Expected
- MER-00383 - Cupola RWS Monitors Did Not Display Monitor Numbers
- MER-00393 - RDC Bit Delta Transient Fail
- MER-00394 - SSRMS FMS Calibration Aborted
- MER-00396 - Redundant String ACU Brake Voltage Errors During Brake Release
- MER-00406 - Cupola RWS Auto Sequence Pause/Proceed Switch Xcheck Anomaly
- MER-00419 - Cupola DOUG application not working
- MER-00420 - PFM Carrier on SSRMS Video Line Flicker
- MER-00437 - SSRMS Dynamic Grapple Fixture Release
- MER-00438 - SSRMS Load Cell Drift
- MER-00439 - RHC Slide Switch

7A FRR: Robotics Status

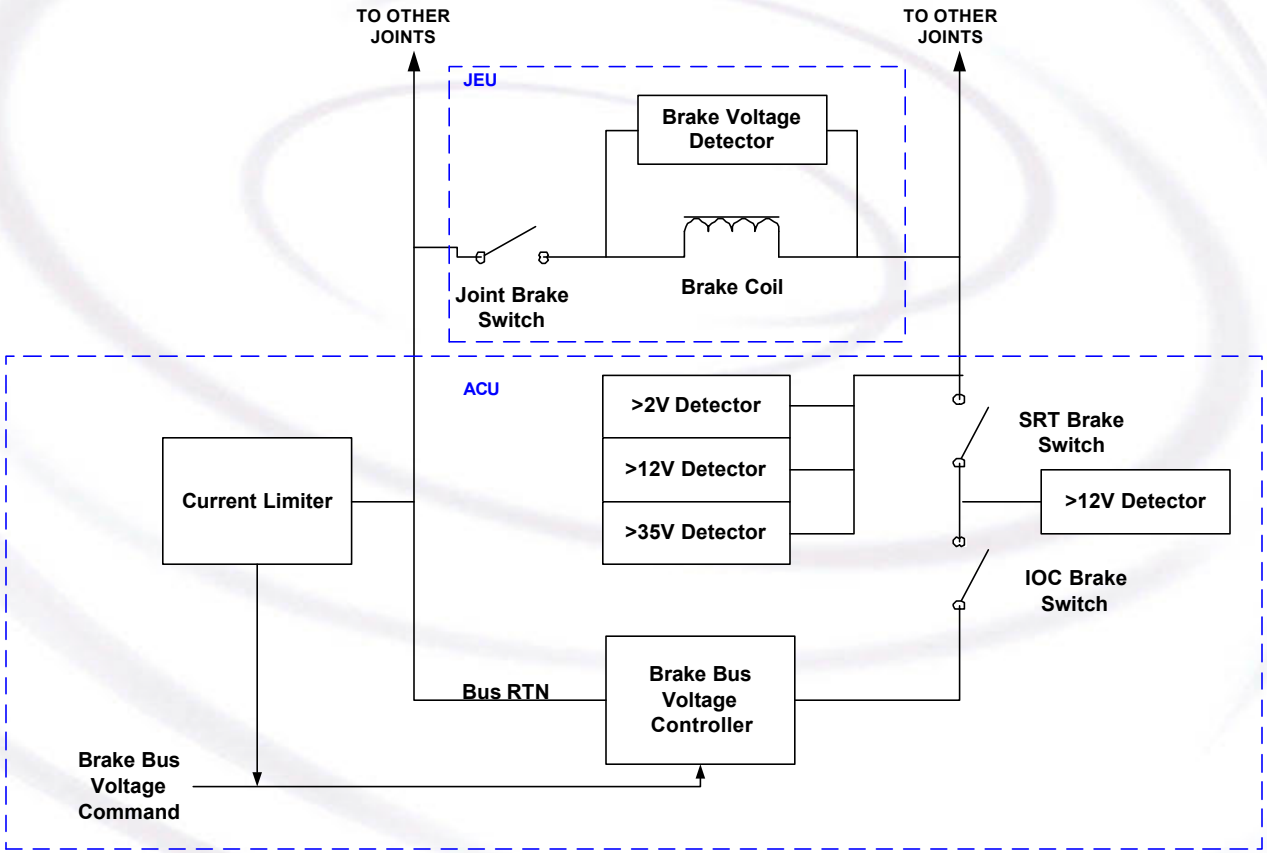
Back-up Slides

7A FRR: Robotics Status

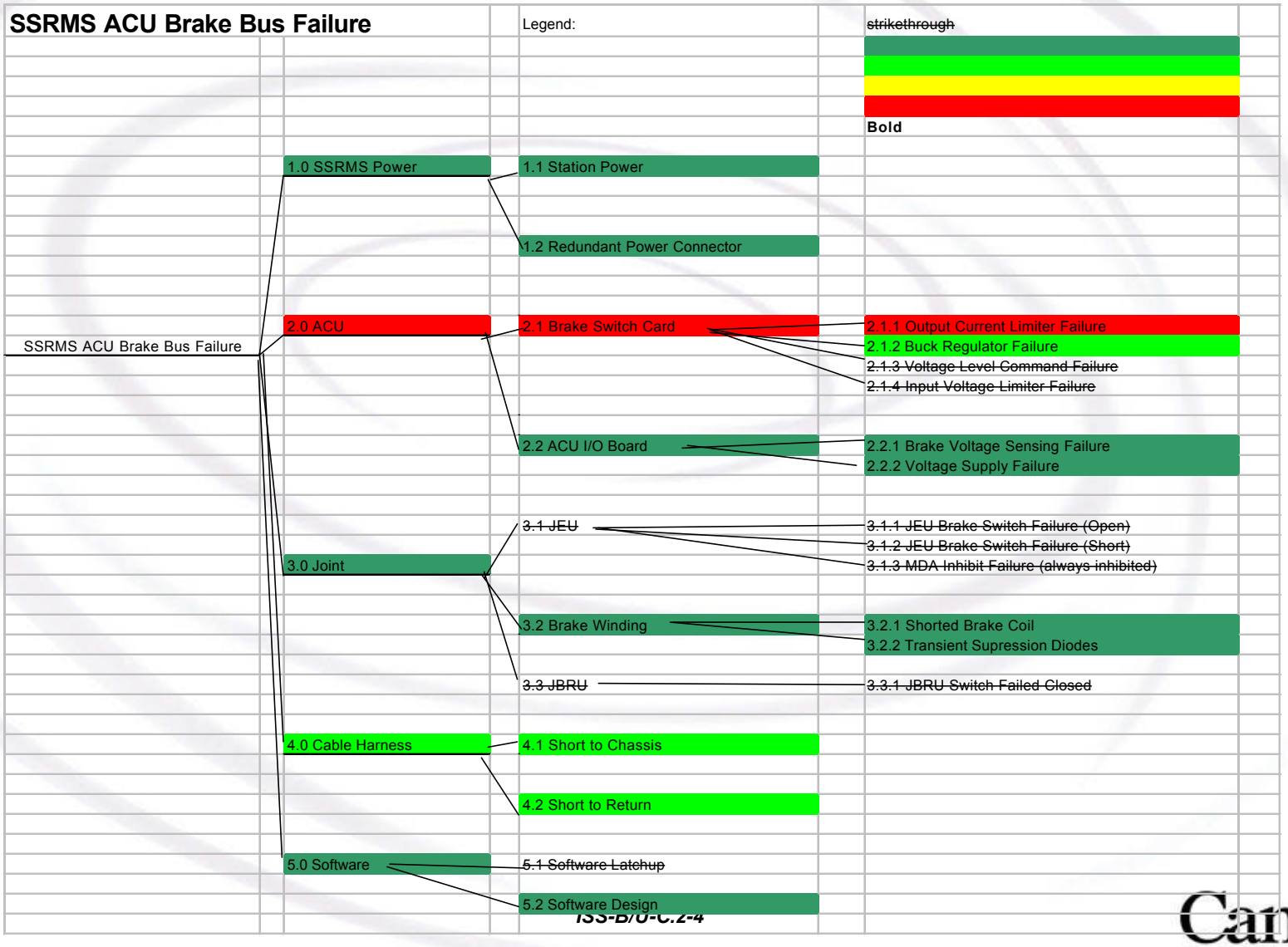
- Patch testing summary:
  - CSCI-level V&V on JCS and AHS;
  - Complete SACS validation suite;
  - Regression tested on MAIF for 7A control modes.
- Action Item status:
  - 7A-D SORR-003: Investigate the need for the 1553 chipset/loop back software patch for the ACU, VDU, and LEU and plan for incorporation.
    - CLOSED: Patches being developed for ACU, VDU & LEU.
    - ART is considering impact of larger ACU patch.
  - 7A-D SORR-005: Provide an operations plan (ie: which version, when it should be uploaded, …) for Canadarm2 software.
    - CLOSED: Joint implementation plan prepared & submitted by CSA/B. Marcotte, NASA/DA8/P.Hill.
  - 7A-D SORR-006: Investigate and verify the SSRMS load capacity with Airlock attached, but not installed.
    - CLOSED: Letters identifying SSRMS load capacity for particular cases sent to NASA, supporting analysis reports published.

7A FRR: Robotics Status

- Brake Bus architecture



ACU Brake Bus Failure Fault Tree:



ACU Brake Bus Failure Fault Tree - Rationale:

SSRMS ACU Brake Bus Voltage Failure

Branch Number	Branch Title	Action	Actionee	ECD	Related Task Ids	Result	Rationale
1.0	SSRMS Power						
1.1	Station Power					Highly unlikely	EPS group reported no anomalies on station power during failure events. SSRMS was only equipment on prime and redundant RPCMs during the failures. EMS testing detemined that ACU can tolerate down to 96 V without losing brake voltage, and below this value
1.2	Redundant Power Connector					Highly unlikely	SSRMS power not successfully applied when connector mated during EVA. Connector had to be re-mated to successfully apply power. PDGF local bus switched to channel B to shake out any problems in the connector. No comm errors were found during this test.
2.0	ACU						
2.1	Brake Switch Card						
2.1.1	Output Current Limiter Failure					Likely	Output current limiter failure could result in erroneous limiting of brake bus current, which has the effect of reducing the brake bus voltage and would be present only when current is flowing on the bus (i.e. the bus is loaded). The failure could either

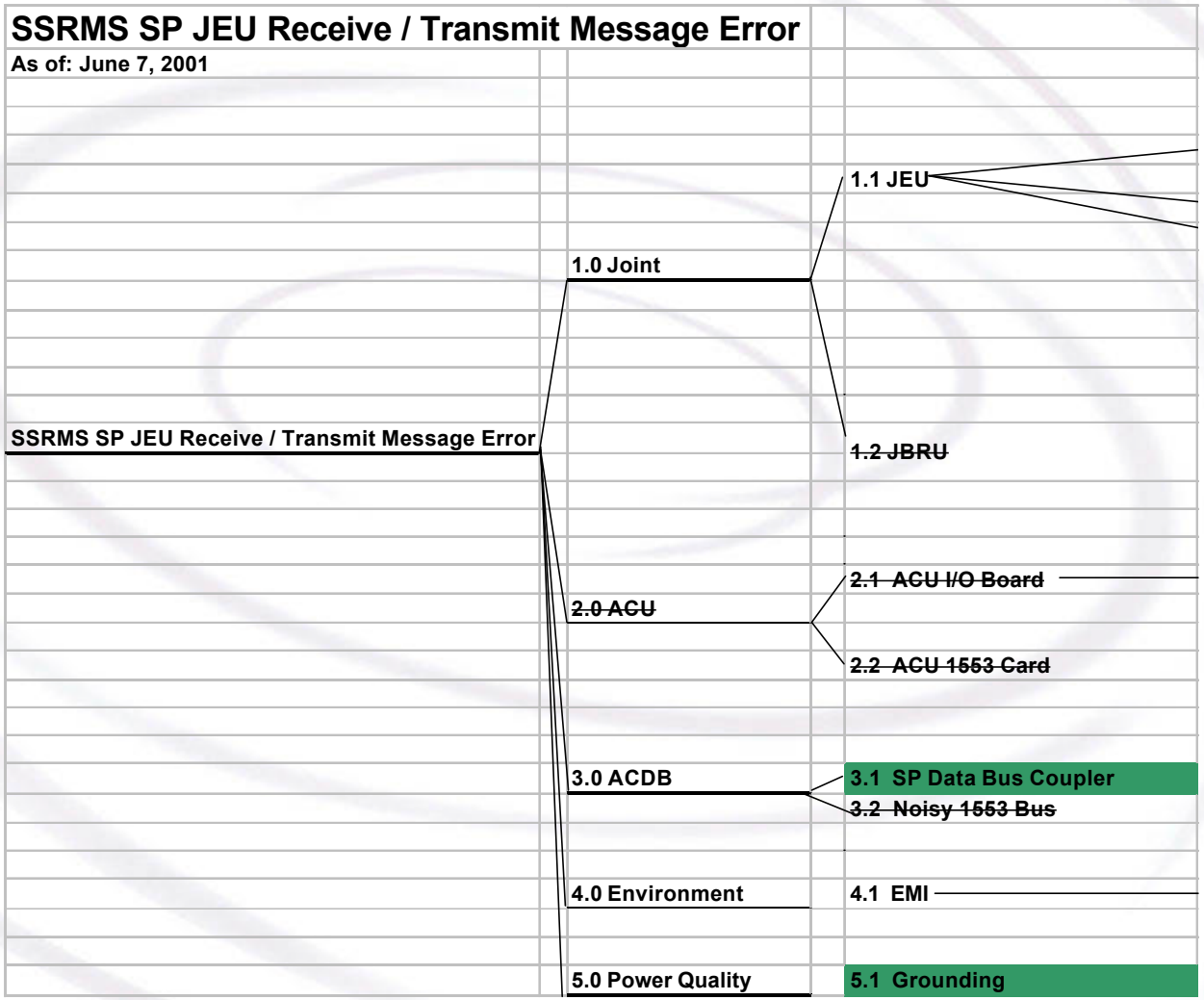
ACU Brake Bus Failure Fault Tree - Rationale:

2.1.2	Buck Regulator Failure					Unlikely	Effect of buck regulator failure not expected to be dependent on brake bus loading. During diagnostic tests, failure annunciated only when bus was loaded.
2.1.3	Voltage Level Command Failure					Ruled Out	Voltage level command to buck regulator is independent of brake bus loading. During diagnostic tests, failure annunciated only when bus was loaded.
2.1.4	Input Voltage Limiter Failure					Ruled Out	Failure of voltage input limiter would result in ACU brake overcurrent trip messages. These messages were not seen.
2.2	ACU I/O Board						
2.2.1	Brake Voltage Sensing Failure					Highly unlikely	Effect of brake voltage sensing failure (the brake bus voltage is correct, but the ACU incorrectly detects the voltage level) would be independent of brake bus loading. During diagnostic tests, failure annunciated only when bus was loaded.
	Voltage Supply Failure					Highly unlikely	No unusual signatures seen in ACU voltages at the time of the failures, including the +12 V supply which is used to drive the ACU brake switch and brake voltage control.
3.0	Joint						
3.1	JEU						
3.1.1	JEU Brake Switch Failure (Open)					Ruled Out	JEU brake switch failure open would result in inability to remove brakes for a single joint only. Failure signature would be JEU brake status error (not seen). Would not result in loss of brake bus voltage.
3.1.2	JEU Brake Switch Failure (Short)					Ruled Out	Drain-to-gate short in JEU brake switch could not result in current draw on brake bus return path to activate output current limiter.
3.1.3	MDA Inhibit Failure (always inhibited)					Ruled Out	MDA always inhibited affects only one joint. Would not result in loss of brake voltage.
3.2	Brake Winding						
3.2.1	3.2.1 Shorted Brake Coil					Highly unlikely	Short would have result in a narrow range of resistances to cause output current limiting. Physical configuration of coil (Class H triple insulation, designed for up to 200 C, vacuum impregnated) makes short highly unlikely unlikely.

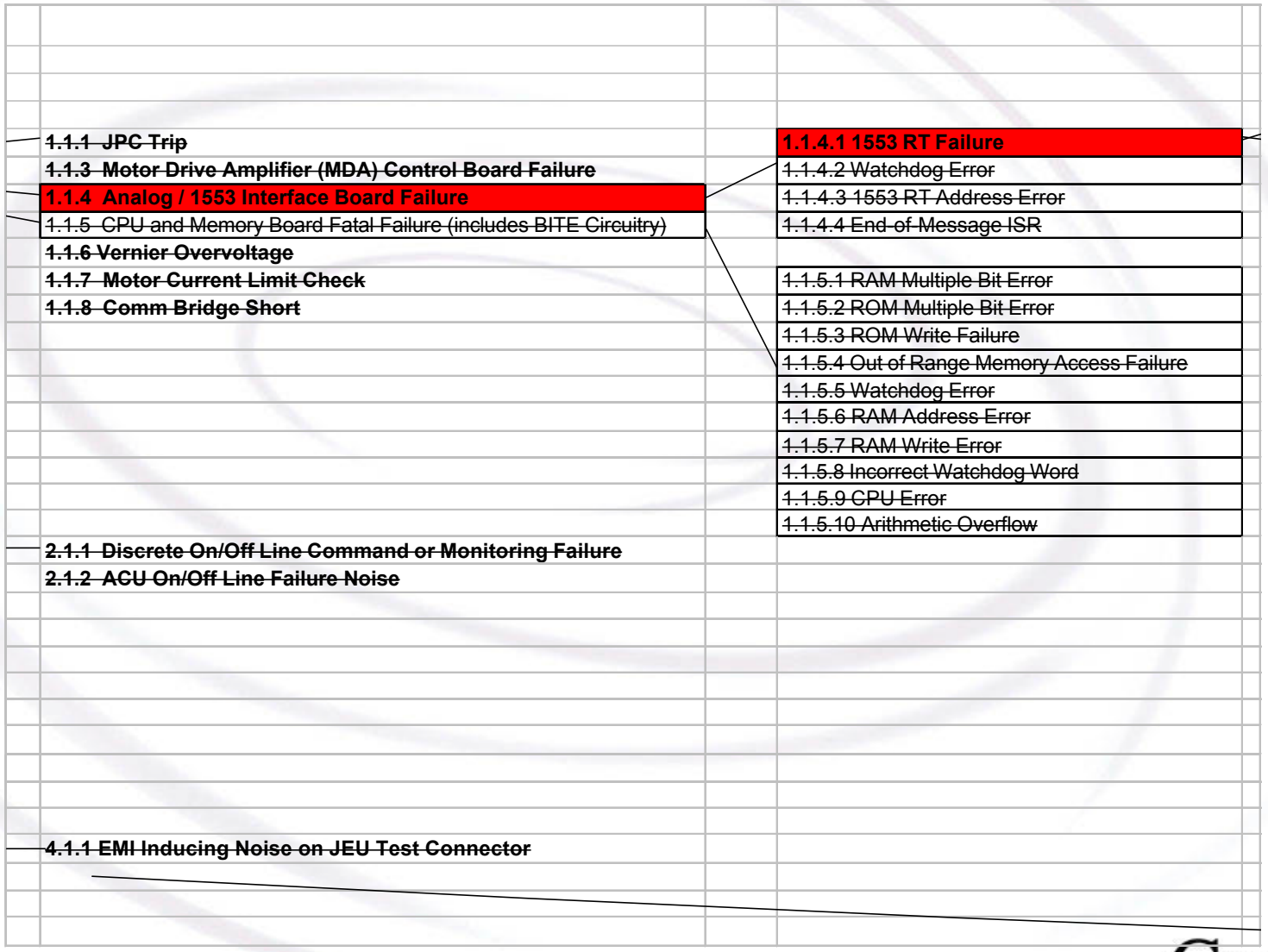
ACU Brake Bus Failure Fault Tree - Rationale:

3.2.2	3.2.2 Transient Supression Diodes					Highly unlikely	Both diodes would have to fail short in one brake coil, and resulting resitance of short would have to be in a narrow range to cause output current limiting.
3.3	JBRU						
3.3.1	JBRU Switch Failed Closed					Ruled Out	Review of design and test history revealed no failures that could cause this signature. Review of test records indicate no JBRU failures that could cause the brake bus undervoltage.
4.0	Cable Harness						
4.1	Short to Chassis					Unlikely	Short to chassis would not cause output current limiting, so would not cause drop in voltage by this mechanism. Short would require a minimum resistance of 7.3 ohm so as not to cause input current trip. Resistance through chassis is on order of 1 ohm or l
4.2	Short to Return					Unlikely	A short of this kind could cause output current limiting that would result in brake bus undervoltage. However, line to line short would be required, and short would have to lie in narrow range of resistances. No evidence of a short was found in the SSRMS
5.0	Software						
5.1	Software Latchup					Ruled Out	Software was rebooted on whole arm (power cycled to OFF and back) between occurrences of failure.
5.2	Software Design					Highly unlikely	Invesigation on-going. Preliminary indication based on historical info is that timing-related software failures are rare and random. This behaviour is inconsistent with observed failure signature.

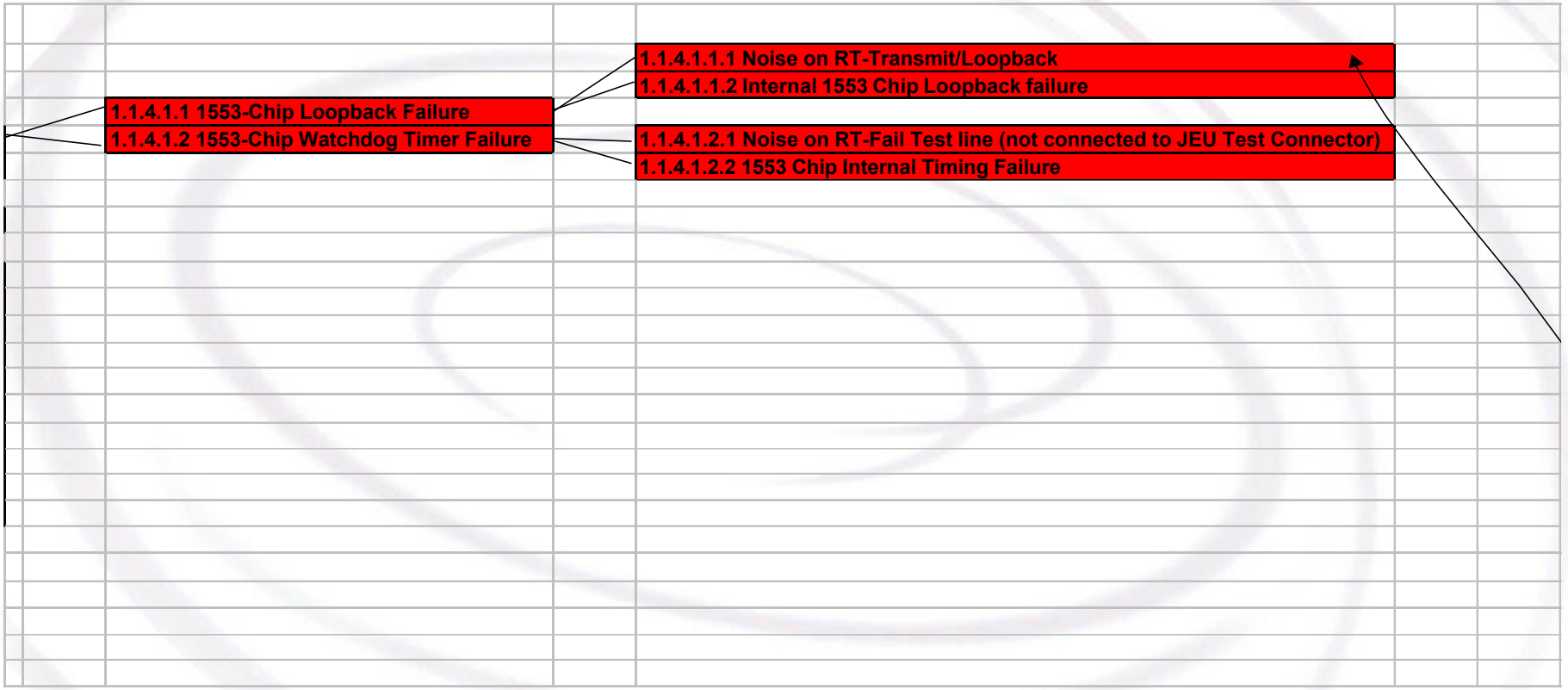
SSRMS SP JEU Fault Tree:



SSRMS SP JEU Fault Tree:



SSRMS SP JEU Fault Tree:



SSRMS SP JEU Fault Tree - Rationale:

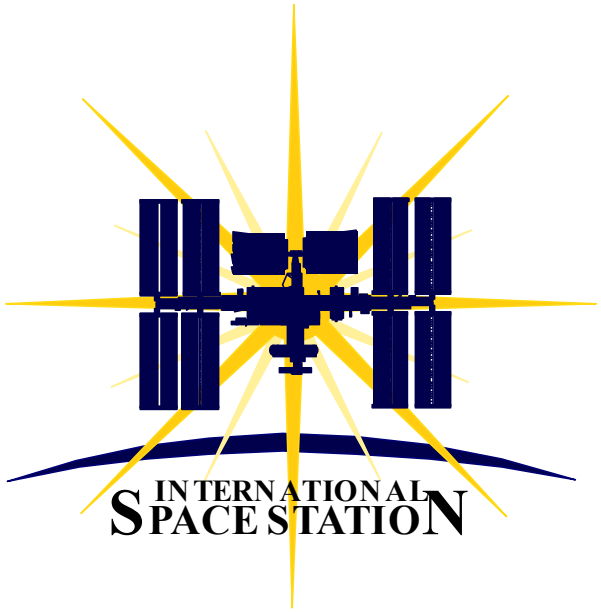
SSRMS SP JEU Receive / Transmit Message Error							
As of: June 7, 2001							
Branch Number	Branch Title	Action	Actionee	ECD	Related Task Ids	Result	Rationale
1.0	**JOINT**						
1.1	JEU						
1.1.1	JPC Trip					Rule out.	JCS/AHS Patch ruled out the JPC as the cause of the failures.
1.1.2	Motor Drive Amplifier Control Board Failure					Ruled out.	During initialization and Standby state four hardware interlocks (MDA Inhibit, Buck Regulator Switch, Motor Drive Switches, and Commutation Bridge) are configured to prevent MDA from being capable of applying current to motor. Motor Over-current check is
1.1.3	Analog/1553 Interface Board Failure						
1.1.3.1	1553 RT Failure					Likely cause	JCS/AHS Patch implicated RT Failure in the single snap shot of data that was obtained.
1.1.3.2	Watchdog Error					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.3.3	1553 RT Address Failure					Ruled out.	AHS Patch was executed which utilized a different 1553 RT Address. Since JEU was able to momentarily talk on the new RT address indicates that the address latch circuitry is functional.
1.1.3.4	End-of-Message ISR					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4	CPU & Memory Board Failure						
1.1.4.1	RAM Multiple BIT Error					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.2	ROM Multiple BIT Error					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.3	ROM Write Error					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.4	Out of Range Memory Access Failure					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.5	Watchdog Error					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.6	RAM Address Error					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.7	RAM Write Failure					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.8	Incorrect Watchdog Check Word					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.9	CPU Error					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.4.10	Arithmetic Overflow					Rule out.	JCS/AHS Patch #2 ruled out this cause.
1.1.5	Vernier Overvoltage					Ruled out.	Vernier Over-Voltage check is not performed in initialization or Standby state and therefore is ruled out as the source of the loss of communication.

SSRMS SP JEU Fault Tree - Rationale:

1.1.6	Motor Current Limit Check					Ruled out.	During initialization and Standby state four hardware interlocks (MDA Inhibit, Buck Regulator Switch, Motor Drive Switches, and Commutation Bridge) are configured to prevent MDA from being capable of applying current to motor. Motor Over-current check is
1.1.7	Comm Bridge Short					Ruled out.	During initialization and Standby state four hardware interlocks (MDA Inhibit, Buck Regulator Switch, Motor Drive Switches, and Commutation Bridge) are configured to prevent MDA from being capable of applying current to motor. Motor Over-current check is
1.2	JBRU					Ruled out.	JBRU was originally suspected since the brake bus and the resovler windings pass through Joint Back-Up Relay Unit (which could be related to the ACU Brake Bus failure observed and the WR RDC Bit failure). The watchdog timer has a 3kHz clock input which ha
2.0	**ACU**						
2.1	ACU I/O Board					Ruled Out.	JCS/AHS Patch Ruled out ACU being cause of failure
2.2	ACU 1553 Card					Ruled Out.	No failure mode has been identified whereby the ACU 1553 card would be capable of consistently talking to the other 6 JEUs, tip LEU, and 4 VDUs, but not be capable of talking to the SP JEU. ACU 1553 card failure would affect communication with all units o
3.0	**ACDB**						
3.1	SP 1553 Bus Coupler					Highly Unlikely	Failure has only been observed to appear at two discrete points in the state of the JEU: 1) when attempting to set its RT address, and 2) when transitioning to Standby state. Repeatability of failure in these two states and in no other states would requir

SSRMS SP JEU Fault Tree - Rationale:

3.2	Noisy 1553 Bus					Ruled Out	No failure mode has been identified whereby the ACU would be capable of consistently talking to the other 6 JEUs, tip LEU, and 4 VDUs, but not be capable of talking to the SP JEU. 1553 bus failures would affect communication with all units on the bus.
4.0	**ENVIRONMENT**						
4.1	EMI		MDR			Ruled out.	MDR confirmed in MIS records that JEU test connector was installed. Also, JEU/AHS Patch #2 ruled out the JEU test connector as the cause of the RT-FAIL flag due to the fact that the 1553 Chip echoed back in it's status word that the RT-FAIL was set…thereb
5.0	**POWER QUALITY**						
5.1	Grounding					Unlikely Cause	Failure has only been observed to appear at two discrete points in the state of the JEU: 1) when attempting to set its RT address, and 2) when transitioning to Standby state. Repeatability of failure in these two states and in no other states would requir
	JCS/AHS Patch will either eliminate this cause from the fault tree or leave it as a possible candidate.						
	JCS/AHS Patch will either point to this cause or eliminate this cause from fault tree						



7A Flight Readiness Review

Berthing Loads during CBM Capture

End-to-End Berthing Integration Team

Brian Richard/Boeing

June 28, 2001

International Space Station Program Office

Backup Data

Documentation and Continued Efforts

- **Documentation**
  - EBIT meeting minutes - complete
  - HSV (Lab, Airlock) Structures Final report - complete
  - CSA final acceptance - complete
  - Hazard Report ISS-MCH-0109-7A Cause 48 closure - June 28

- **Continuing Efforts**
  - Correlate SES and MSFC Canadarm2 simulations
    - Significant differences in 3-RTL load results data
    - Canadarm2 LEE flex model implementation

4-RTL Canadarm2 Brakes-on HSV Data
4 Latch pull to complete/stall, 10 degree step

- **CSA and Boeing-HSV agree loads are acceptable**

			Wrist End Effector		Shoulder End Effector	
run #	case #	max shear	max torsion	max bending	max torsion	max bending
		lbf	ft-lbf	ft-lbf	ft-lbf	ft-lbf
1b	1	59.35	**781.81**	426.69	474.68	215.76
2b	2	27.20	499.96	484.22	297.65	621.55
4b	5	36.32	**795.69**	529.12	346.33	479.62
5b	6	24.59	372.27	733.31	756.77	441.32
27b	82	32.63	**704.51**	512.97	336.51	514.23
Max Allowed		180.00	700.00	1200.00	Combined 1750	
Notes:	Run #1b exceedence occurred during initial capture to stall.					
	Run #4b exceedence occurred during command from 100 to 90 degrees.					
	Run #27b exceedence occurred during command from 80 to 70 degrees.					

4-RTL Canadarm2 Brakes-on SES Data
4 Latch pull to complete/stall

- **CSA and Boeing-HSV agree loads are acceptable**
  - Maximum values identified for review

case #	bf_RSS(lb	bm_RSS(	j1_dr_m(lb	j2_dr_m(lb	j3_dr_m(lb	j4_dr_m(lb	j5_dr_m(lb	j6_dr_m(lb	j7_dr_m(lb	j1_of_m(lb	j2_of_m(lb	j3_of_m(lb	j4_of_m(lb	j5_of_m(lb	j6_of_m(lb	j7_of_m(lb	torsional(l	bending(lb
1.00	39.44	390.00	308.55	212.54	317.12	516.61	335.85	203.01	90.78	259.68	351.50	239.83	182.86	178.12	347.13	422.26	90.76	585.38
2.00	24.32	553.03	302.31	294.99	464.77	413.79	175.05	386.98	123.20	625.00	583.07	389.49	269.45	372.41	214.45	410.02	123.20	502.77
5.00	22.39	355.38	276.34	202.56	278.64	476.85	157.82	165.12	342.63	235.38	314.40	224.66	390.48	407.34	367.46	181.63	342.63	208.40
6.00	17.61	409.68	334.08	220.61	338.85	405.46	354.38	121.70	125.52	276.62	374.24	310.59	196.72	143.76	360.82	362.46	125.53	436.93
26.00	29.98	515.98	494.91	229.61	377.66	385.73	152.62	377.90	140.30	297.73	439.91	466.02	334.03	418.55	211.74	387.25	140.29	499.80
27.00	17.55	429.72	189.78	369.34	215.40	492.94	227.09	159.85	210.69	397.73	295.78	357.66	321.37	306.07	386.56	324.61	210.67	379.72
53.00	**98.83**	1090.62	900.96	222.27	713.57	**1269.20**	228.46	**701.36**	411.71	459.79	802.34	640.86	602.77	**902.56**	454.00	701.51	411.72	854.53
82.00	87.97	**1941.40**	508.16	856.14	**1586.29**	548.38	**699.41**	535.93	**563.74**	**2211.02**	**1902.83**	1400.86	780.53	720.31	**840.32**	**814.39**	**563.46**	**1146.48**
94.00	21.49	275.79	123.80	205.57	132.61	575.13	290.64	172.89	130.75	286.31	247.77	252.12	229.94	191.67	297.83	264.94	130.75	251.38
112.00	46.28	708.17	426.66	513.67	247.25	405.31	348.85	436.72	439.44	660.52	504.53	704.23	730.49	605.83	559.82	459.10	439.43	658.33
134.00	20.37	501.82	241.92	465.92	209.69	458.58	191.81	284.38	81.31	467.43	263.46	461.21	457.90	291.60	195.61	319.05	81.32	352.17
181.00	58.06	1154.62	**1078.19**	148.00	981.57	579.96	337.03	256.68	65.36	569.25	1092.10	483.62	270.22	370.03	363.61	350.22	65.32	412.90
190.00	30.41	319.68	128.35	71.00	159.49	596.20	472.23	403.03	230.67	288.68	273.28	259.21	323.65	372.50	484.65	535.02	230.75	607.76
203.00	57.56	1020.94	482.19	836.89	397.81	529.79	369.41	374.86	273.75	1091.79	707.94	1080.06	874.37	423.43	381.87	491.63	273.74	736.51
215.00	60.66	828.51	807.78	370.27	564.66	568.13	332.92	484.34	144.36	405.64	686.84	771.29	678.00	621.34	434.11	521.87	144.14	643.91
225.00	51.91	825.89	623.89	672.75	311.32	296.07	152.47	290.40	262.15	749.00	586.79	916.84	888.97	425.36	371.40	290.44	262.06	478.44
232.00	71.60	1528.08	836.47	**1103.46**	328.11	567.73	215.84	566.98	371.24	1491.82	1135.42	**1557.55**	**1050.30**	642.61	487.12	568.01	371.23	862.27
max.col	98.83	1941.40	1078.19	1103.46	1586.29	1269.20	699.41	701.36	563.74	2211.02	1902.83	1557.55	1050.30	902.56	840.32	814.39	563.46	1146.48

- **FPLL violations:**
  - Base Moment /Joint Drive Axis Torque <10%
  - Joint Cross-Axis Torque >40% (3 cycles /yr)

3-RTL Canadarm2 Brakes-on HSV Data
3 Latch pull to 130 degrees, 5 degree step

- **CSA and Boeing-HSV agree loads are acceptable**
  - Expect no surprises from on-going model correlation

				Wrist End Effector		Shoulder End Effector	
run #	case #	max axial	max shear	max torsion	max bending	max torsion	max bending
		lbf	lbf	ft-lbf	ft-lbf	ft-lbf	ft-lbf
10 deg → 28	84	16.08	56.50	955.63 / 847.04 / 753.50	514.28	299.18	300.25
28a	84	4.61	27.06	337.67	332.86	526.54	368.69
5 deg → 28b	84	16.36	69.26	666.47	495.58	204.65	389.53
Max Allowed			180.00	700.00	1200.00	3150.00	3150.00

Gearbox Torques

		Max Gearbox Torques						
run #	case #	SR	SY	SP	EP	WP	WY	WR
		ft-lbf	ft-lbf	ft-lbf	ft-lbf	ft-lbf	ft-lbf	ft-lbf
28	84	298.69	147.22	287.95	561.21	385.44	188.20	144.02
28a	84	526.68	121.01	578.05	199.77	145.73	100.43	209.88
28b	84	204.34	189.44	218.66	364.87	257.28	174.16	192.53

Note: Run 28 is 3-Latch Capture to 130 degrees, then 10 degree increments to 12 degrees.
Run 28a is 3-Latch Capture to Stall.
Run 28b is 3-Latch Capture to 130 degrees, then 5 degree increments to 12 degrees.

3-RTL Canadarm2 Brakes-on HSV Data
3 Latch pull to 130 degrees, 10 degree step

- **CSA and Boeing-HSV agree loads are marginal**
  - Identified reducing 3 latch step size to 5 degrees to reduce loads

			Wrist End Effector		Shoulder End Effector	
run #	case #	max shear	max torsion	max bending	max torsion	max bending
		lbf	ft-lbf	ft-lbf	ft-lbf	ft-lbf
43	161	52.51	683.86	612.33	526.80	371.07
10	13	55.88	469.96	780.46	334.75	633.61
47	184	60.81	560.90	785.01	1647.98	456.95
23	55	64.91	598.51	524.16	1183.30	458.68
49	193	37.74	449.57	849.20	218.18	233.63
28	84	56.50	**955.63 / 847.04 / 753.50**	514.28	299.18	300.25
56	227	41.81	620.88	687.80	207.33	250.53
45	169	74.89	**702.06**	688.21	158.53	385.21
36	114	35.14	**779.16**	656.86	220.19	411.86
53	213	41.26	**729.90 / 897.52 / 731.60 / 839.24**	501.03	123.30	254.58
22	54	25.38	556.84	416.75	144.00	524.34
44	164	117.48	**710.10 / 710.92**	544.95	270.94	445.08
11	15	25.45	596.72	707.95	206.00	632.94
52	206	29.87	638.50	387.58	371.47	357.46
15	30	23.70	565.62	709.38	338.26	392.49
29	85	42.15	**708.65**	580.00	172.23	521.38
7	8	41.72	**825.07**	710.58	320.32	304.64
Max Allowed		180.00	700.00	1200.00	Combined 1750	

Notes:	First four runs (43, 10, 47, 23) were second stage capture to stall; remainder were capture to 130 degrees.
	Run #28 exceedences occurred during command from 70 to 60, 60 to 50, and 50 to 40 degrees.
	Run #45 exceedence occurred during command from 80 to 70 degrees.
	Run #36 exceedence occurred during command from 90 to 80 degrees.
	Run #53 exceedences occurred during command from 80 to 70, 70 to 60, 60 to 50, and 50 to 40 degrees.
	Run #44 exceedences occurred during command from 90 to 80, and 80 to 70 degrees.
	Run #29 exceedence occurred during command from 40 to 30 degrees.
	Run #7 exceedence occurred during command from 80 to 70 degrees.

3-RTL Canadarm2 Brakes-on SES Data
3 Latch pull to complete/stall

- **CSA and Boeing-HSV agree loads are NOT acceptable**
  - Identified stopping 3-RTL, 3 latch command at 130 degrees

case #	baseF	baseM	JTQ(1)	JTQ(2)	JTQ(3)	JTQ(4)	JTQ(5)	JTQ(6)	JTQ(7)	M(1)	M(2)	M(3)	M(4)	M(5)	M(6)	M(7)	torsion	bendin	shear(l	axial(lbf
3	59.35	358.36	210.96	278.46	219.98	1152.58	200.30	187.10	497.24	287.96	272.90	268.44	591.47	525.08	603.34	343.73	497.23	588.19	54.86	21.17
7	55.33	364.68	233.93	270.22	321.36	1064.99	184.82	242.58	586.76	366.34	399.42	295.79	691.35	621.84	677.90	354.10	586.74	583.73	51.72	16.43
8	30.65	1108.73	287.10	220.85	640.29	465.57	680.17	211.54	1118.31	1008.40	1002.55	788.68	1020.73	985.11	1161.42	467.16	1118.33	578.74	25.43	17.55
9	53.17	999.68	303.05	278.34	629.29	425.03	869.92	262.87	932.99	862.19	815.38	565.27	863.50	805.47	987.71	750.63	933.01	958.26	47.35	19.58
10	27.06	1222.96	317.48	234.78	896.52	890.07	398.07	128.67	1302.89	1278.85	1295.28	1020.64	1273.28	1230.02	1321.85	185.93	1302.91	243.64	24.90	16.54
13	137.65	1690.30	822.78	746.52	1086.51	972.88	1289.10	1717.79	1238.95	1995.89	1761.53	1703.19	1464.07	1926.66	1637.47	1901.17	1235.27	2516.00	221.24	77.59
15	113.06	1303.56	835.62	694.19	543.35	356.79	1110.16	1457.43	958.33	1325.07	1140.80	1310.62	1234.86	1555.70	1344.45	1609.92	958.55	2113.81	113.02	16.46
28	58.36	397.01	317.59	221.66	333.48	1090.92	127.23	296.44	457.83	276.44	362.07	245.96	575.41	545.58	575.40	406.60	457.76	643.06	53.48	19.63
30	54.67	1153.26	475.31	217.85	508.25	528.61	983.80	356.48	942.93	930.76	898.42	783.27	815.54	801.66	1039.98	860.67	942.94	1085.83	51.28	17.31
31	53.48	509.55	278.51	390.91	133.37	707.62	809.19	535.69	1326.91	416.54	504.99	448.48	1415.83	1359.50	1464.52	591.92	1326.90	830.84	53.69	19.48
32	97.62	905.91	127.89	429.10	292.27	1666.30	301.01	194.30	459.19	626.78	390.40	345.86	490.32	426.94	510.16	521.92	459.22	898.34	84.36	46.82
33	46.00	1028.71	328.49	254.35	562.46	530.12	876.62	358.36	928.20	886.29	850.60	713.73	816.00	781.10	991.68	791.18	928.20	976.45	42.07	14.08
34	51.36	1186.51	848.49	357.99	432.73	661.28	411.91	395.04	720.37	768.84	1042.61	1059.45	614.54	698.93	685.40	506.66	720.41	718.16	49.59	15.35
44	90.41	939.73	500.24	571.24	318.21	527.66	1213.72	955.32	953.96	976.79	785.05	928.81	960.11	1172.99	1395.05	1240.71	954.40	1639.64	90.07	12.56
54	66.18	788.98	744.73	407.23	368.99	1063.47	268.15	158.75	560.51	410.56	675.71	670.88	562.82	605.60	643.60	403.62	560.59	586.25	46.84	44.58
55	55.66	1510.05	400.53	574.37	1048.91	393.93	174.86	397.02	689.02	1549.99	1321.86	963.05	702.27	715.27	702.33	404.95	689.06	565.74	38.24	41.57
65	63.73	788.49	614.16	198.57	277.81	543.32	786.04	1031.47	555.03	573.58	697.55	730.33	583.99	1113.94	885.58	1174.92	555.11	1458.14	63.70	17.41
66	49.82	418.12	190.28	223.76	198.60	874.08	282.10	453.08	422.34	333.05	222.80	247.64	494.51	558.22	512.78	455.11	422.26	618.99	43.94	25.82
67	67.67	1139.97	436.05	299.60	971.99	490.51	465.58	981.91	276.58	1344.49	1209.12	842.83	264.68	942.14	515.07	1004.61	276.52	1288.08	65.89	20.29
84	44.85	795.47	230.37	300.66	519.48	585.48	270.67	170.49	710.01	694.78	634.15	369.46	797.27	777.90	750.59	254.83	710.04	242.51	27.56	34.29
85	48.28	499.09	355.43	259.71	449.36	704.85	231.88	304.30	1073.06	620.53	705.49	614.61	1323.14	1258.17	1305.92	695.17	1073.04	899.49	46.71	16.27
91	77.50	857.45	332.60	431.18	294.96	1173.75	490.93	111.97	218.28	566.49	428.51	485.52	303.19	139.02	492.07	527.83	218.20	834.54	70.59	29.84
97	54.00	1237.22	484.82	630.05	482.59	574.77	424.27	548.68	308.15	1201.21	1012.64	1071.68	527.90	495.18	427.15	639.18	308.11	858.10	53.26	19.37
100	80.96	605.03	294.70	262.55	487.50	688.03	852.66	924.32	762.09	702.44	631.22	449.98	837.58	1091.50	970.43	1090.74	762.21	1430.57	80.09	17.36
113	41.27	658.90	446.44	331.68	625.01	310.31	627.66	520.77	812.00	655.48	634.36	385.33	716.74	851.06	923.41	544.84	811.94	721.28	41.08	21.14
114	60.52	1529.39	178.66	410.51	1045.09	574.81	302.18	164.36	884.17	1457.49	1288.49	852.54	859.10	854.80	854.74	243.65	884.17	334.21	32.21	50.41
115	51.42	521.74	155.82	504.41	261.55	895.71	533.23	235.81	846.68	506.69	473.14	479.83	953.55	778.67	933.33	275.03	846.72	490.90	48.38	16.63
117	55.73	1166.52	357.15	384.35	833.52	720.52	206.17	828.85	407.22	1246.41	1075.94	939.44	368.33	783.09	366.81	839.87	407.19	1072.41	57.40	17.30
137	77.56	942.66	481.33	71.71	269.42	1018.07	699.06	427.83	453.65	592.22	693.83	601.02	402.81	465.90	704.42	793.59	453.74	1105.38	72.78	22.29
138	32.65	1521.73	804.67	850.00	405.02	436.57	350.83	211.32	1143.32	1354.42	1283.37	1494.89	1219.88	1133.32	1156.39	565.44	1143.33	668.65	28.50	11.54
140	67.10	1283.43	527.46	252.38	972.56	478.36	475.54	220.86	800.56	1141.91	1060.27	505.97	809.28	762.09	801.32	428.26	800.49	623.42	44.27	47.98
161	80.73	983.24	840.95	381.17	339.98	576.14	601.78	888.92	935.82	701.42	871.76	993.13	1175.04	1330.38	1056.49	901.60	935.89	1242.98	117.50	53.18
164	39.29	1281.54	792.63	580.88	372.80	350.46	709.68	220.54	764.99	1018.61	1042.81	1153.25	668.14	578.04	819.74	507.92	765.01	668.58	36.87	28.03
169	123.81	1255.90	93.94	429.21	1152.97	575.96	1392.99	1443.55	966.40	1644.55	1411.97	1023.09	822.58	1392.60	1485.34	1739.71	969.00	2242.96	224.99	45.81
184	103.75	1647.78	637.61	351.61	1208.22	1153.38	466.99	194.05	594.16	1430.88	1270.03	452.49	771.46	701.72	692.03	428.71	594.13	436.07	55.54	84.79
193	133.11	2324.66	1111.35	1136.73	1078.55	367.34	861.43	1678.48	800.40	2403.11	2067.37	2129.75	1208.65	1651.70	972.77	1758.71	800.42	2346.62	137.52	18.29
205	34.93	975.70	524.42	692.66	167.66	445.14	255.29	237.84	645.51	853.85	694.25	966.42	799.03	676.23	647.05	512.37	645.54	616.56	30.34	13.67
206	23.76	1405.52	663.11	817.27	397.64	527.62	522.27	100.98	1070.67	1260.39	1126.41	1328.40	1014.60	932.69	1044.22	265.84	1070.68	336.09	22.71	15.57
213	62.03	1139.93	512.91	812.25	493.66	495.72	563.35	336.68	243.86	1255.89	985.85	1225.53	810.13	346.56	564.08	574.88	243.81	839.59	61.32	14.55
227	101.94	1492.01	933.62	822.40	476.26	417.07	559.69	1209.19	806.63	1442.36	1260.92	1448.36	1251.43	1427.51	912.71	1230.57	806.62	1662.16	97.92	30.14
max.col	137.65	2324.66	1111.35	1136.73	1208.22	1666.30	1392.99	1717.79	1326.91	2403.11	2067.37	2129.75	1464.07	1926.66	1637.47	1901.17	1326.90	2516.00	224.99	84.79