

# **INDEPENDENT ORBITER ASSESSMENT**

**ASSESSMENT  
OF THE  
REACTION CONTROL  
SYSTEM  
Vol. 5 of 5**

**26 FEBRUARY 1988**



**APPENDIX E  
DETAILED ANALYSIS**

This appendix contains the IOA analysis worksheets supplementing previous results reported in STSEOS Working Paper 1.0-WP-VA86001-27, Analysis of the Reaction Control System, (19 January 1987). Prior results were obtained independently and documented before starting the FMEA/CIL assessment activity. Supplemental analysis was performed to address failure modes not previously considered by the IOA. Each sheet identifies the hardware item being analyzed, parent assembly and function performed. For each failure mode possible causes are identified, and hardware and functional criticality for each mission phase are determined as described in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. Failure mode effects are described at the bottom of each sheet and worst case criticality is identified at the top.

**LEGEND FOR IOA ANALYSIS WORKSHEETS**  
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**Hardware Criticalities:**

- 1 = Loss of life or vehicle
- 2 = Loss of mission or next failure of any redundant item (like or unlike) could cause loss of life/vehicle
- 3 = All others

**Functional Criticalities:**

- 1R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission.

**Redundancy Screen A:**

- 1 = Is Checked Out PreFlight
- 2 = Is Capable of Check Out PreFlight
- 3 = Not Capable of Check Out PreFlight
- NA = Not Applicable

**Redundancy Screens B and C:**

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10001 ABORT: 1/1

ITEM: PRESSURE RELIEF ASSEMBLY  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PRESSURE RELIEF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0421

CAUSES: BELLOWS/HOUSING FAILURE, MATERIAL/MANUFACTURING DEFECT,  
HIGH PRESSURE

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE IS LOSS OF LIFE/VEHICLE DUE TO LOSS OF HELIUM PRESSURANT, INABILITY TO USE/DEplete PROP, AND POSSIBLE VENTING OF PROP OR PROP VAPORS INTO POD CREATING FIRE/EXPLOSION HAZARD. INABILITY TO DEplete PROP MAY RESULT IN VIOLATION OF ORBITER ENTRY MASS PROPERTY CONSTRAINTS, CAUSING LOSS OF LIFE/VEHICLE.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/16/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 10002 ABORT: 2/1R

ITEM: HE ISOL VLV  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) HE ISOL VLV
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ F ]

LOCATION:  
PART NUMBER: 73P620001

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

WITH RESTRICTED FLOW IN ONE TANK ISOL VALVE, ONE FAILURE (RESTRICTED FLOW IN PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESSURIZE PROP TANK, INABILITY TO USE/DEplete PROP, AND POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTY CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/16/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10003 ABORT: 1/1

ITEM: HE ISOL VLV  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) HE ISOL VLV
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:  
PART NUMBER: 73P620001

CAUSES: HOUSING FAILURE, MATERIAL/MANUFACTURING DEFECT, BELLOWS AND SEAL FAILURE, HIGH PRESSURE, WELD FAILURE

EFFECTS/RATIONALE:  
FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT, INABILITY TO USE/DEplete PROP, AND POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/17/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 10004 ABORT: 3/1R

ITEM: HE PRESS REGULATOR ASSEMBLY  
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) HE PRESS REGULATOR ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:

PART NUMBER: MC284-0418

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT, SEAL FAILURE, PRESSURE SURGE

EFFECTS/RATIONALE:

FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY RESULTS IN  
POSSIBLE LOSS OF LIFE/VEHICLE DUE TO EITHER OVERPRESSURIZATION  
AND RUPTURE OF PROP TANK, OR LOSS OF HELIUM THRU RELIEF VALVE,  
INABILITY TO USE/DEplete PROP, AND POSSIBLE VIOLATIONS OF  
ORBITER ENTRY MASS PROPERTY CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/18/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10005 ABORT: 1/1

ITEM: QUAD CHECK VALVE ASSEMBLY  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) QUAD CHECK VALVE ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0481

CAUSES: CONTAMINATION, FILTER BLOCKAGE

EFFECTS/RATIONALE:

BLOCKAGE OF SINGLE INLET FILTER RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY. INABILITY TO REPRESS PROP TANK AND SUBSEQUENT INABILITY TO USE OR DEplete PROP MAY LEAD TO VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/18/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10006 ABORT: 1/1

ITEM: QUAD CHECK VALVE ASSEMBLY  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) QUAD CHECK VALVE ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0481

CAUSES: HOUSING FAILURE, MATERIAL/MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HE PRESSURANT AND SUBSEQUENT INABILITY TO USE OR DEplete PROP RESULTING IN POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS. MAY ALSO ALLOW LEAKAGE OF PROP OR PROP VAPORS LEADING TO FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/21/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 10007 ABORT: 2/1R

ITEM: PRESSURE RELIEF ASSEMBLY  
FAILURE MODE: VALVE FAILS OPEN, OR LEAKS INTERNALLY

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PRESSURE RELIEF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION:

PART NUMBER: MC284-0421

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE,  
MECHANICAL SHOCK, MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

WITH FIRST FAILURE, ONE FAILURE (PREMATURE RUPTURE OR LEAK OF BURST DISK) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF HELIUM PRESSURANT, INABILITY TO MAINTAIN PROP TANK PRESSURE, AND INABILITY TO USE/DEplete PROP RESULTING IN POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS. FAILURES ALSO RESULT IN LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/21/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 10008 ABORT: 3/1R

ITEM: PRESSURE RELIEF ASSEMBLY  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PRESSURE RELIEF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 3 ] B [NA ] C [ P ]

LOCATION:

PART NUMBER: MC284-0421

CAUSES: CONTAMINATION, FILTER BLOCKAGE

EFFECTS/RATIONALE:

FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY (REGS) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES RESULTING IN FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/21/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10009 ABORT: 1/1

ITEM: PRESSURE RELIEF ASSEMBLY  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PRESSURE RELIEF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0421

CAUSES: HOUSING STRUCTURAL FAILURE, MATERIAL/MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. LOSS OF HELIUM PRESSURANT AND INABILITY TO MAINTAIN PROP TANK PRESSURE RESULTS IN INABILITY TO USE/DEplete PROP AND POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS. FAILURE ALSO ALLOWS LEAKAGE OF PROP, CREATING FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10010 ABORT: 1/1

ITEM: PROP TANK ISOL VLVS 1/2 & 3/4/5  
FAILURE MODE: RELIEF DEVICE FAILS TO RELIEVE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PROP TANK ISOL VLVS 1/2 & 3/4/5
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	3/3
LIFTOFF:	1/1	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE  
RUPTURE OF DOWNSTREAM LINES AND LOSS AND LEAKAGE OF PROP  
RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.  
VALVES OPEN DURING ABORTS.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/23/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 10011 ABORT: 1/1

ITEM: PROP TANK ISOL VLVS 1/2 & 3/4/5  
FAILURE MODE: FAILS MID-TRAVEL

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PROP TANK ISOL VLVS 1/2 & 3/4/5
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/11R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

WORST CASE EFFECTS ARE THE SAME AS A FAILED CLOSED VALVE. WITH FIRST FAILURE, ONE FAILURE (FAIL MID-TRAVEL OF CLOSED OF PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO USE OR DEplete FRCS PROP RESULTING IN POSSIBLE VIOLATIONS OR ORBITER ENTRY MASS PROPERTIES CONSTRAINTS. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF TWO FRCS YAW JETS AND POSSIBLE INABILITY TO COMPLETE FRCS DUMP.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10012 ABORT: 1/1

ITEM: MANIFOLD 1-4 ISOLATION VALVES  
FAILURE MODE: RELIEF DEVICE FAILS TO RELIEVE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1-4 ISOLATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	3/3
LIFTOFF:	1/1	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE  
RUPTURE OF DOWNSTREAM LINES, AND LOSS/LEAKAGE OF PROP RESULTING  
IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. VALVES OPEN  
DURING ABORTS.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 10013 ABORT: 1/1

ITEM: MANIFOLD 1-4 ISOLATION VALVES  
FAILURE MODE: FAILS MID-TRAVEL

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1-4 ISOLATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, IMPROPER INPUT, MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

WORST CASE EFFECTS ARE THE SAME AS THOSE FOR A FAILED CLOSED VALVE. WITH FIRST FAILURE, ONE FAILURE (FAILS MID-TRAVEL OR CLOSED OF ANOTHER MANIFOLD ISOL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO INABILITY TO PERFORM FRCS DUMP POST DEORBIT BURN RESULTING IN POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF TWO YAW JETS AND POSSIBLE INABILITY TO COMPLETE FRCS DUMP.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10014 ABORT: 1/1

ITEM: MANIFOLD 5 ISOLATION VALVE  
FAILURE MODE: RELIEF DEVICE FAILS TO RELIEVE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5 ISOLATION VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0420

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE  
RUPTURE OF DOWNSTREAM LINES, AND LOSS/LEAKAGE OF PROP RESULTING  
IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/28/87 HIGHEST CRITICALITY HDW/FUNC  
 SUBSYSTEM: FRCS FLIGHT: 3/2R  
 MDAC ID: 10015 ABORT: 3/2R

ITEM: THRUSTER BIPROP SOLENOID VALVE, PRIMARY, +Z AXIS  
 FAILURE MODE: FAILS CLOSED, FAILS OFF

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER BIPROP SOLENOID VALVE, PRIMARY, +Z AXIS
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 3 ] B [ P ] C [ P ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF INPUT, FROZEN PROPELLANT, MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY (ALL FRCS +Z JETS) IS POSSIBLE LOSS OF MISSION. +Z JETS NOT CRITICAL FOR ET SEP, FRCS DUMPING, OR ENTRY CONTROL.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/28/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10016 ABORT: 1/1

ITEM: THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES  
FAILURE MODE: FAILS ON, PREMATURE OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
PREMATURE/CONTINUOUS/IMPROPER INPUT

EFFECTS/RATIONALE:

FIRST FAILURE DURING FLIGHT COULD RESULT IN CONTACT WITH PAYLOAD  
DURING RENDEZVOUS, CAUSING LOSS OF VEHICLE OR EVA CREW. FIRST  
FAILURE DURING GROUND PHASES COULD RESULT IN LOSS OF GROUND CREW  
DUE TO EXPOSURE TO PROP VAPORS AND EXHAUST PLUME.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/29/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10017 ABORT: 1/1

ITEM: THRUSTER BIPROP SOLENOID VALVE, VERNIER, ALL AXES  
FAILURE MODE: FAILS ON, PREMATURE OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER BIPROP SOLENOID VALVE, VERNIER, ALL AXES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0029

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
PREMATURE/CONTINUOUS/IMPROPER INPUT

EFFECTS/RATIONALE:

FIRST FAILURE DURING FLIGHT COULD RESULT IN CONTACT WITH PAYLOAD  
DURING RENDEZVOUS, CAUSING LOSS OF VEHICLE OR EVA CREW. FIRST  
FAILURE DURING GROUND PHASES COULD RESULT IN LOSS OF GROUND CREW  
DUE TO EXPOSURE TO PROP VAPORS AND EXHAUST PLUME.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/29/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10018 ABORT: 1/1

ITEM: THRUSTER INJECTOR HEAD ASSEMBLY, PRIMARY  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER INJECTOR HEAD ASSEMBLY, PRIMARY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: CONTAMINATION, PROP FREEZING

EFFECTS/RATIONALE:

FIRST FAILURE COULD RESULT IN LOSS OF LIFE/VEHICLE. IMPROPER MISTURE RATIO OR INADEQUATE COOLING COULD RESULT IN COMBUSTION CHAMBER OR NOZZLE EXTENSION BURN-THROUGH.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/29/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10019 ABORT: 1/1

ITEM: THRUSTER INJECTOR HEAD ASSEMBLY, PRIMARY  
FAILURE MODE: STRUCTURAL FAILURE, BURN-THROUGH

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER INJECTOR HEAD ASSEMBLY, PRIMARY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL/MANUFACTURING DEFECT, COMBUSTION ANOMALIES, CONTAMINATION

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. MIXING OF MMH AND N2O4 IN INJECTOR, OR BURN-THROUGH OF INJECTOR RESULTS IN POSSIBLE FIRE/EXPLOSION AND DAMAGE TO VEHICLE.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/02/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/1R  
MDAC ID: 10020 ABORT: 2/1R

ITEM: HE ISOL VLV  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) HE ISOL VLV
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/2R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ F ]

LOCATION:  
PART NUMBER: MC284-0419

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

WITH RESTRICTED FLOW IN ONE ISOL VLV, ONE FAILURE (RESTRICTED FLOW OR FAILED CLOSED PARALLEL VLV) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO INABILITY TO REPRESS PROP TANK, INABILITY TO USE OR DEplete PROP, AND POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43DA

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/02/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10021 ABORT: 1/1

ITEM: HE ISOL VLV  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) HE ISOL VLV
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/2	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0419

CAUSES: HOUSING FAILURE, MATERIAL/MANUFACTURING DEFECT, BELLOWS AND SEALS FAILURES, HIGH PRESSURE, WELD FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY DUE TO LOSS OF HELIUM PRESSURANT, INABILITY TO USE OR DEplete PROP, AND POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43DA



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/05/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/1R
MDAC ID:	10022	ABORT:	3/1R

ITEM: HE PRESS REGULATOR ASSEMBLY  
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) HE PRESS REGULATOR ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ F ]                      C [ P ]

LOCATION:  
PART NUMBER: MC284-0418

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT, SEAL FAILURE, PRESSURE SURGE

EFFECTS/RATIONALE:  
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DUE TO EITHER OVERPRESSURIZATION AND RUPTURE OF PROP TANK, OR LOSS OF HELIUM THRU RELIEF VALVE, INABILITY TO USE OR DEplete PROP, AND POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND/OR PROP TANK LANDING WEIGHT CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.5    2) VS70-943099, 43CA, DA

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/05/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10023 ABORT: 1/1

ITEM: QUAD CHECK VALVE ASSEMBLY  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) QUAD CHECK VALVE ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0481

CAUSES: CONTAMINATION, FILTER BLOCKAGE

EFFECTS/RATIONALE:

BLOCKAGE OF SINGLE INLET FILTER RESULTS IN POSSIBLE LOSS OF LIFE/VEHICLE DURING ENTRY. INABILITY TO REPRESS PROP TANK AND SUBSEQUENT INABILITY TO USE OR DEplete PROP MAY RESULT IN VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS OR PROP TANK LANDING WEIGHT CONSTRAINTS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CA, DA

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/05/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10024 ABORT: 1/1

ITEM: QUAD CHECK VALVE ASSEMBLY  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) QUAD CHECK VALVE ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:  
PART NUMBER: MC284-0481

CAUSES: HOUSING FAILURE, MATERIAL/MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:  
FIRST FAILURE OF POSSIBLE LOSS OF LIFE/VEHICLE. LOSS OF HE PRESSURANT, INABILITY TO MAINTAIN PROP TANK PRESSURE, AND SUBSEQUENT INABILITY TO USE OR DEplete PROP RESULTS IN POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT OCNSTRAINTS. FIRST FAILURE MAY ALSO ALLOW LEAKAGE OF PROP OR PROP VAPORS LEADING TO FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CA, DA

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/1R  
MDAC ID: 10025 ABORT: 2/1R

ITEM: PRESSURE RELIEF ASSEMBLY  
FAILURE MODE: VALVE FAILS OPEN, OR LEAKS INTERNALLY

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PRESSURE RELIEF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	21/R
DEORBIT:	2/1R	ATO:	21/R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION:

PART NUMBER: MC284-0421

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE,  
MECHANICAL SHOCK, MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

WITH FIRST FAILURE, ONE FAILURE (PREMATURE RUPTURE OR LEAK OF BURST DISK) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF HELIUM PRESSURANT, INABILITY TO MAINTAIN PROP TANK PRESSURE, AND INABILITY TO USE OR DEplete PROP RESULTING IN POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRIANTS. FAILURES ALSO RESULT IN LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CA, DA

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 10026 ABORT: 3/1R

ITEM: PRESSURE RELIEF ASSEMBLY  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PRESSURE RELIEF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 3 ] B [NA ] C [ P ]

LOCATION:  
PART NUMBER: MC284-0421

CAUSES: CONTAMINATION, FILTER BLOCKAGE

EFFECTS/RATIONALE:  
FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY (REGS) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS AND LINES RESULTING IN FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CA, DA

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10027 ABORT: 1/1

ITEM: PRESSURE RELIEF ASSEMBLY  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PRESSURE RELIEF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0421

CAUSES: HOUSING STRUCTURAL FAILURE, MATERIAL/MANUFACTURING DEFECT, HIGH PRESSURE

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. LOSS OF HELIUM PRESSURANT AND INABILITY TO MAINTAIN PROP TANK PRESSURE RESULTS IN INABILITY TO USE OR DEplete PROP AND POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS. FAILURE ALSO ALLOWS LEAKAGE OF PROP OR PROP VAPORS, CREATING FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CA, DA

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/1R  
MDAC ID: 10028 ABORT: 2/1R

ITEM: PROP TANK ISOL VLVS 3/4/5  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PROP TANK ISOL VLVS 3/4/5
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ F ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, FILTER BLOCKAGE

EFFECTS/RATIONALE:

WITH RESTRICTED FLOW IN ONE 3/4/5 VALVE, ONE FAILURE (RESTRICTED FLOW OR FAILED CLOSED PARALLEL VALVE) AWAY FROM POSSIBLE LOSS OF LIFE/VEHICLE DUE TO IMPROPER FLOW RATE TO THRUSTERS. AN IMPROPER MISTURE RATIO OR INADEQUATE COOLING AS A RESULT OF RESTRICTED PROP FLOW COULD RESULT IN COMBUSTION CHAMBER OR NOZZLE EXTENSION BURN-THROUGH.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CB, DB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/07/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10029 ABORT: 1/1

ITEM: PROP TANK ISOL VLV 1/2  
FAILURE MODE: RELIEF DEVICE FAILS TO RELIEVE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PROP TANK ISOL VLV 1/2
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	3/3
LIFTOFF:	1/1	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FALIURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE  
RUPTURE OF DOWNSTREAM LINES, AND LOSS/LEAKAGE OF PROP RESULTING  
IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. VALVES OPEN  
DURING ABORTS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CB, DB



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/07/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/1R  
MDAC ID: 10030 ABORT: 2/1R

ITEM: PROP TANK ISOL VLVS 3/4/5  
FAILURE MODE: RELIEF DEVICE FAILS TO RELIEVE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PROP TANK ISOL VLVS 3/4/5
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	3/3
LIFTOFF:	2/1R	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:  
PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FAILURE OF RELIEF VALVE IN ONE 3/4/5 VALVE IS UNDETECTABLE AND IS OF NO EFFECT. PARALLEL VALVE DEVICE WILL RELIEVE DOWNSTREAM PRESSURE. FAILURE OF DEVICES IN BOTH 3/4/5 VALVES IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE RUPTURE OF DOWNSTREAM LINES, AND LOSS/LEAKAGE OF PROP RESULTING IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. VALVES OPEN DURING ABORTS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CB, DB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/07/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 10031 ABORT: 1/1

ITEM: PROP TANK ISOL VLV 1/2  
FAILURE MODE: FAILS MID-TRAVEL

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PROP TANK ISOL VLV 1/2
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT, IMPROPER INPUT

EFFECTS/RATIONALE:

WORST CASE EFFECTS ARE THE SAME AS THOSE FOR A FAILED CLOSED VALVE. FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF THRUSTERS, RESULTING IN INABILITY TO PERFORM ET SEP AND LOSS OF ENTRY CONTROL. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE INABILITY TO COMPLETE ARCS DUMP.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CB, DB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/07/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 10032 ABORT: 2/1R

ITEM: PROP TANK ISOL VLVS 3/4/5  
FAILURE MODE: FAILS MID-TRAVEL

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) PROP TANK ISOL VLVS 3/4/5
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT, IMPROPER INPUT

EFFECTS/RATIONALE:

WORST CASE EFFECTS ARE THE SAME AS THOSE FOR A FAILED CLOSED VALVE. FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF THRUSTERS, RESULTING IN INABILITY TO PERFORM ET SEP AND LOSS OF ENTRY CONTROL.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CB, DB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 10033 ABORT: 3/1R

ITEM: RCS CROSSFEED VLVS 1/2 & 3/4/5  
FAILURE MODE: RELIEF DEVICE FAILS CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) RCS CROSSFEED VLVS 1/2 & 3/4/5
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY (ALL OTHER  
CROSSFEED VALVES) IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO  
OVERPRESSURIZATION AND POSSIBLE RUPTURE OF CROSSFEED LINES,  
RESULTING IN LOSS OF PROPELLANT, FIRE/EXPLOSION HAZARD, AND  
HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099, 43CD, DD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/08/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	2/2
MDAC ID:	10034	ABORT:	1/1

ITEM: RCS CROSSFEED VLVS 1/2 & 3/4/5  
FAILURE MODE: FAILS MID-TRAVEL

LEAD ANALYST: C.D. PRUST                      SUBSYS LEAD: C.D. PRUST

**BREAKDOWN HIERARCHY:**

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) RCS CROSSFEED VLVS 1/2 & 3/4/5
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/2R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:  
PART NUMBER:    MC284-0430

CAUSES:    CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT, IMPROPER INPUT

EFFECTS/RATIONALE:  
WORST CASE EFFECTS ARE THE SAME AS THOSE FOR A FAILED CLOSED VALVE. FIRST FAILURE RESULTS IN POSSIBLE LOSS OF MISSION DUE TO LOSS OF CROSSFEED/INTERCONNECT CAPABILITY. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF RCS THRUSTERS FOR OMS PROP DUMPING, RESULTING IN AN IMCOMPLETE OMS DUMP.

REFERENCES:    1) JSC 11174, 11.5    2) VS70-943099, 43CD, DD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10035 ABORT: 1/1

ITEM: MANIFOLD 1-4 ISOL VALVES  
FAILURE MODE: RELIEF DEVICE FAILS CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1-4 ISOL VALVES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	3/3
LIFTOFF:	1/1	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE  
RUPTURE OF DOWNSTREAM LINES, AND LOSS/LEAKAGE OF PROP RESULTING  
IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. VALVES OPEN  
DURING ABORTS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10036 ABORT: 1/1

ITEM: VERNIER MANIFOLD ISOL VALVE  
FAILURE MODE: RELIEF DEVICE FAILS CLOSED

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) VERNIER MANIFOLD ISOL VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	1/1	RTLS:	3/3
LIFTOFF:	1/1	TAL:	3/3
ONORBIT:	1/1	AOA:	3/3
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC284-0420

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, VIBRATION,  
MATERIAL/MANUFACTURING DEFECT

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO POSSIBLE  
RUPTURE OF DOWNSTREAM LINES, AND LOSS/LEAKAGE OF PROP RESULTING  
IN FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND CREW. VALVES OPEN  
DURING ABORTS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 10037 ABORT: 1/1

ITEM: MANIFOLD 1-4 ISOL VALVES  
FAILURE MODE: FAILS MID-TRAVEL

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1-4 ISOL VALVES
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION:

PART NUMBER: MC284-0430

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT, IMPROPER INPUT

EFFECTS/RATIONALE:

WORST CASE EFFECTS ARE THE SAME AS THOSE FOR A FAILED CLOSED VALVE. FIRST FAILURE IS NO EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF THRUSTERS REQUIRED FOR ET SEP AND ENTRY CONTROL. FIRST FAILURE DURING RTLS OR TAL IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO LOSS OF ONE MANIFOLD AND POSSIBLE INABILITY TO COMPLETE ADEQUATE OMS AND/OR RCS DUMPS.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10038 ABORT: 1/1

ITEM: THRUSTER BIPROP SOLENOID VALVE, PRIMARY, ALL AXES  
FAILURE MODE: PREMATURE OPERATION, FAILS ON

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER BIPROP SOLENOID VALVE, PRIMARY, ALL AXES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0428

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
PREMATURE/CONTINUOUS/IMPROPER INPUT

EFFECTS/RATIONALE:

FIRST FAILURE DURING FLIGHT COULD RESULT IN CONTACT WITH PAYLOAD  
DURING RENDEZVOUS, CAUSING LOSS OF VEHICLE OR EVA CREW. FIRST  
FAILURE DURING GROUND PHASES COULD RESULT IN LOSS OF GROUND CREW  
DUE TO EXPOSURE TO PROP VAPORS AND EXHAUST PLUME.

REFERENCES: 1) JSC 11174, 11.5 2) VS70-943099

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10039 ABORT: 1/1

ITEM: THRUSTER BIPROP SOLENOID VLV, VERNIER, ALL AXES  
FAILURE MODE: PREMATURE OPERATION, FAILS ON

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER BIPROP SOLENOID VLV, VERNIER, ALL AXES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0029

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
PREMATURE/CONTINUOUS/IMPROPER INPUT

EFFECTS/RATIONALE:

FIRST FAILURE DURING FLIGHT COULD RESULT IN CONTACT WITH PAYLOAD DURING RENDEZVOUS, CAUSING LOSS OF VEHICLE OR EVA CREW. FIRST FAILURE DURING GROUND PHASES COULD RESULT IN LOSS OF GROUND CREW DUE TO EXPOSURE TO PROP VAPORS AND EXHAUST PLUME.

REFERENCES: 1) JSC 11174 2) VS70-943099

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10040 ABORT: 1/1

ITEM: THRUSTER INJECTOR HEAD ASSY, PRIMARY  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER INJECTOR HEAD ASSY, PRIMARY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLs:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: CONTAMINATION, PROP FREEZING

EFFECTS/RATIONALE:

FIRST FAILURE COULD RESULT IN LOSS OF LIFE/VEHICLE. IMPROPER MIXTURE RATIO OR INADEQUATE COOLING COULD RESULT IN COMBUSTION CHAMBER OR NOZZLE EXTENSION BURN-THROUGH.

REFERENCES: 1) JSC 11174 2) VS70-943099

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10041 ABORT: 1/1

ITEM: THRUSTER INJECTOR HEAD ASSY, PRIMARY  
FAILURE MODE: STRUCTURAL FAILURE, BURN-THROUGH

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER INJECTOR HEAD ASSY, PRIMARY
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: PIECE-PART STRUCTURAL FAILURE, MATERIAL/MANUFACTURING DEFECT, COMBUSTION ANOMALIES, CONTAMINATION

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. MIXING OF MMH AND N2O4 IN INJECTOR, OR BURN-THROUGH OF INJECTOR RESULTS IN POSSIBLE FIRE/EXPLOSION AND DAMAGE TO VEHICLE.

REFERENCES: 1) JSC 11174 2) VS70-943099



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/26/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 1/1  
MDAC ID: 10043 ABORT: 1/1

ITEM: THRUSTER BIPROP SOLENOID VALVE, PRIMARY, ALL AXES  
FAILURE MODE: DELAYED OPERATION, ONE VALVE OPENS SLOWLY OR LATE

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER BIPROP SOLENOID VALVE, PRIMARY, ALL AXES
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/NA	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
MATERIAL/MANUFACTURING DEFECT, IMPROPER INPUT

EFFECTS/RATIONALE:

FIRST FAILURE IS POSSIBLE LOSS OF LIFE/VEHICLE. DELAYED OPENING OF THE OXIDIZER VALVE COULD RESULT IN MIGRATION OF FUEL INTO THE OXIDIZER INJECTOR TUBE AND DETONATION WITHIN TUBE UPON OXIDIZER FLOW. RUPTURE OF VALVE ASSEMBLY DUE TO JET ZOTS REQUIRED IN LEAKAGE OF PROP, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW.

REFERENCES: 1) JSC 11174 2) VS70-943099

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/28/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 1/1  
MDAC ID: 10116 ABORT: 1/1

ITEM: THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES  
FAILURE MODE: FAILS ON, PREMATURE OPERATION

LEAD ANALYST: C.D. PRUST SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	1/1		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: MC467-0028

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE,  
PREMATURE/CONTINUOUS/IMPROPER INPUT

EFFECTS/RATIONALE:

FIRST FAILURE DURING FLIGHT COULD RESULT IN CONTACT WITH PAYLOAD  
DURING RENDEZVOUS, CAUSING LOSS OF VEHICLE OR EVA CREW. FIRST  
FAILURE DURING GROUND PHASES COULD RESULT IN LOSS OF GROUND CREW  
DUE TO EXPOSURE TO PROP VAPORS AND EXHAUST PLUME.

REFERENCES: 1) JSC 11174, 11.6 2) VS70-942099, 42BN, BT





INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11001 ABORT: 3/1R

ITEM: FUSE, 1A  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) FUSE, 1A
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 F39

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO INHIBIT THE GROUND DRIVER MANUALLY. GROUND DRIVER CAN STILL BE INHIBITED BY MDM FF2. LOSS OF THIS REDUNDANCY PREVENTS CLOSING THE ISOLATION VALVE, WHICH COULD PREVENT ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11003 ABORT: 3/1R

ITEM: MANIFOLD 5, OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) MANIFOLD 5, OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE WITH THE SWITCH. GPC PROVIDES REDUNDANCY. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH LOSS OF HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11004 ABORT: 3/1R

ITEM: MANIFOLD 5, OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH FAILS CLOSED (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVs
- 5) MANIFOLD 5, OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE IF SWITCH FAILED ACROSS CLOSE CONTACTS. INABILITY TO OPEN THE VALVE CAUSES LOSS OF VERNIERS THUS MISSION OPERATIONS (2/2). SWITCH FAILED SHORT ACROSS OPEN CONTACTS CAUSES INABILITY TO ISOLATE A THRUSTER LEAK (3/1R).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/2
MDAC ID:	11005	ABORT:	2/2

ITEM: MANIFOLD 5, OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) MANIFOLD 5, OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL 08 S34  
PART NUMBER:    33V73A8 S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE IF SWITCH FAILED ACROSS CLOSE CONTACTS. INABILITY TO OPEN THE VALVE CAUSES LOSS OF VERNIERS THUS MISSION OPERATIONS (2/2). SWITCH FAILED SHORT ACROSS OPEN CONTACTS CAUSES INABILITY TO ISOLATE A THRUSTER LEAK. LEAK.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11006 ABORT: 3/1R

ITEM: MANIFOLD 5, OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/SHORTS (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) MANIFOLD 5, OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

INADVERTENTLY OPENING THE ISOLATION VALVE PREVENTS ISOLATION OF A LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11007 ABORT: 3/1R

ITEM: MANIFOLD 5, OX & FU ISOL VLV SWITCH  
FAILURE MODE: SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) MANIFOLD 5, OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW THE 1 AMP FUSE. LOSE CAPABILITY TO CLOSE ISOLATION VALVE WITH THE SWITCH. GPC PROVIDES REDUNDANCY. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11008 ABORT: 3/2R

ITEM: RESISTOR, 1.2K 2W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVs
- 5) RESISTOR, 1.2K 2W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J2-104, J2-83

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR ISOLATION VALVE OPEN OR CLOSE STATUS. MANIFOLD STATUS MONITOR (MDM FF3) PROVIDES LATEST MICROSWITCH DISCRETE INFORMATION OF THE VALVES. VRCS MAY NOT BE USED IF VALVES THOUGHT TO BE CLOSED (LOSS OF MISSION). LOSE INHIBITS TO THE TYPE III "OPEN" AND "CLOSE" HYBRID DRIVERS.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11009	ABORT:	3/3

ITEM: RESISTOR, 1.2K 2W  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) RESISTOR, 1.2K 2W
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                      AV BAY 6, LCA 3  
PART NUMBER:                83V76A18 J2-104, J2-83

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11010 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J14-94

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE CAPABILITY TO MONITOR RPC 28 STATUS WITH MDM OF3. DATA NOT MISSION CRITICAL.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11012 ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J1-88

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE FUEL CLOSED DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FF3). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOLD STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE VALVE STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11013

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J1-91

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE OXIDIZER OPEN DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FF3). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOLD STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE MANIFOLD STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11014 ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J1-90

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE FUEL OPEN DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FF3). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOLD STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE MANIFOLD STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/2R
MDAC ID:	11015	ABORT:	3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	3/3
LIFTOFF:	3/3		TAL:	3/3
ONORBIT:	3/2R		AOA:	3/3
DEORBIT:	3/3		ATO:	3/2R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:            AV BAY 6, LCA 3  
PART NUMBER:    83V76A18 J1-89

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE OXIDIZER CLOSE DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FF3). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOLD STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE MANIFOLD STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11016 ABORT: 3/2R

ITEM: EVENT INDICATOR  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) EVENT INDICATOR
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 DS20

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO VISUALLY MONITOR ISOLATION VALVE OPEN OR CLOSE STATUS. REDUNDANCY IS PROVIDED WITH THE MANIFOLD STATUS MONITOR (MDM FF3). LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11017 ABORT: 3/2R

ITEM: EVENT INDICATOR  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) EVENT INDICATOR
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 DS20

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO VISUALLY MONITOR THE ISOLATION VALVE OPEN OR CLOSE STATUS. REDUNDANCY IS PROVIDED WITH THE MANIFOLD STATUS MONITOR (MDM FF3). LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11018 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 RPC28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE. FAILURE DETECTABLE WITH MDM OF 3.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11019 ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 RPC28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE INHIBITS TO THE TYPE III "CLOSE" DRIVER.  
DETECTABLE WITH MDM OF3.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11020 ABORT: 2/2

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 RPC29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION). DETECTABLE WITH MDM OF1.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11021

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 RPC29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE INHIBIT TO TYPE III "OPEN" DRIVER. DETECTABLE WITH MDM OF1.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11022 ABORT: 3/2R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J4-53 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE VISUAL "CLOSE" INDICATION OF VALVE CLOSURE. ALSO LOSE AN INHIBIT TO THE TYPE III "CLOSE" DRIVER. THE MANIFOLD STATUS MONITOR (MDM FF3) PROVIDES VALVE POSITION DATA. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/1R
MDAC ID:	11023	ABORT:	3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      AV BAY 6, LCA 3  
PART NUMBER:                83V76A18R J4-53 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE OPEN, TALKBACK WILL DISPLAY BARBERPOLE. VALVE STATUS CAN BE MONITORED BY MDM FF3. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED. ALSO LOSE AN INHIBIT TO THE TYPE III "CLOSE" DRIVER SO THAT IT CANNOT BE TURNED ON. THIS PREVENTS CLOSURE OF THE VALVE MANUALLY OR WITH THE GPC AND WILL NOT ALLOW ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11024 ABORT: 3/2R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J4-55 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE VISUAL "OPEN" INDICATION OF VALVE. ALSO LOSE AN INHIBIT TO THE TYPE III "OPEN" DRIVER. THE MANIFOLD STATUS MONITOR (MDM FF3) PROVIDES VALVE POSITION DATA. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11025 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J4-55 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE CLOSED, TALKBACK WILL DISPLAY BARBERPOLE. VALVE STATUS CAN BE MONITORED BY MDM FF3. ALSO LOSE AN INHIBIT TO THE TYPE III "OPEN" DRIVER SO THAT IT CANNOT BE TURNED ON, THUS NOT ALLOWING THE VALVE TO BE OPENED (LOSS OF MISSION).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11026 ABORT: 3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J5-K, L TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE ISOLATION VALVE. THIS PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11027 ABORT: 3/3

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J5-K, L TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE INHIBITS REQUIRED TO CLOSE THE ISOLATION VALVE. THE GROUND DRIVER MUST BE TURNED ON FOR VALVE MOVEMENT. IF VALVE IS ATTEMPTED TO BE OPENED, BOTH SOLENOIDS WILL CONDUCT (WITH PROPER GROUND DRIVER STIMULI). WITH BOTH SOLENOID ENERGIZED THE VALVE WILL TRANSFER TO OR REMAIN OPEN. VALVE CAN BE CLOSED WITH PROPER GROUND DRIVER STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11028 ABORT: 3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J4-71 TYPE I

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE MANUALLY OR WITH GPC. ALSO LOSE AN INHIBIT TO OPEN THE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11029 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J4-71 TYPE I

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. ALSO LOSE INHIBIT TO TURN ON RPC 28. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11030 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J4-51 TYPE I

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION).

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11032 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J5-Y TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN THIS VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION).

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11033 ABORT: 3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18R J5-Y TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE (WITH BOTH SOLENOIDS ENERGIZED, VALVE WILL TRANSFER OR STAY OPEN). INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11034 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA  
PART NUMBER: 83V76A18R J5-G TYPE IV

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH VALVE CLOSED, LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION). WITH VALVE OPEN, LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE (3/1R, PNP).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11035	ABORT:	3/3

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            AV BAY 6, PCA  
PART NUMBER:    83V76A18R J5-G TYPE IV

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSS INHIBIT FROM SWITCH 34 AND GPC INHIBITS FROM MDM FF2 TO TURN THE DRIVER ON.    MANUAL AND GPC VALVE MOVEMENT STILL OPERABLE.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11036 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 J4-16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11037 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 J4-16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY. GPC OPEN/CLOSE COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11038 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 J6-60

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11039 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S34  
PART NUMBER: 33V73A8 J6-60

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY. GPC OPEN/CLOSE COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11044 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J2-87

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CLOSE THE ISOLATION VALVE. ALSO LOSE AN INHIBIT TO OPEN THE ISOLATION VALVE. GPC COMMANDS FOR OPEN/CLOSE STILL OPERABLE. LOSS OF ALL REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11045 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	
		ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J2-87

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM MDM FF1 STIMULI. LOSE MANUAL CLOSE INHIBIT TO THE TYPE III "CLOSE" DRIVER.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11046 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J1-93

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC CAPABILITY TO CLOSE THE ISOLATION VALVE. MANUAL COMMAND FOR OPEN/CLOSE STILL OPERABLE FROM SWITCH 34. LOSS OF REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11047 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 83V76A18 J1-93

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM SWITCH STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/2R
MDAC ID:	11048	ABORT:	3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [NA ]                      C [ P ]

LOCATION:            AV BAY 6, PCA 3  
PART NUMBER:    83V76A24 J13-6

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY.    GPC OPEN/CLOSE COMMANDS STILL OPERABLE.    LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11049 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM MDM FF3 STIMULI. LOSE EXCLUSIVE GPC OPEN INHIBIT TO THE TYPE III "OPEN" DRIVER FROM MDM FF1 (MDM FF3 ALLOWED TO INHIBIT THE TYPE III "OPEN" DRIVER).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11050 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-94

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE WITH GPC. MANUAL OPEN/CLOSE COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/2R
MDAC ID:	11052	ABORT:	3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:            AV BAY 6, PCA 3  
PART NUMBER:    83V76A24 J13-95

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY.    GPC OPEN/CLOSE COMMANDS STILL OPERABLE.    LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES:    ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11053	ABORT:	3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                      AV BAY 6, PCA 3  
PART NUMBER:                83V76A24 J13-95

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.    PROVIDES ISOLATION FROM MDM FF1 STIMULI.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11054 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC CAPABILITY TO OPEN ISOLATION VALVE. MANUAL OPEN/CLOSE COMMANDS FROM SWITCH 34 STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11055 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM SWITCH STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11056 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S34  
PART NUMBER: 33V73A8 J4-8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR OPEN VALVE STATUS VISUALLY. MANIFOLD STATUS MONITOR (MDM FF3) PROVIDES REDUNDANCY FOR VALVE STATUS. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11057	ABORT:	3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                      PNL 08, S34  
PART NUMBER:                33V73A8 J4-8

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.    PROVIDES ISOLATION FROM SWITCH STIMULI.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11058

HIGHEST CRITICALITY  
FLIGHT: 3/2R  
ABORT: 3/2R

HDW/FUNC  
3/2R  
3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN  
SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08, S34  
PART NUMBER: 33V73A8 J4-6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR CLOSE VALVE STATUS VISUALLY. MANIFOLD STATUS MONITOR (MDM FF3) PROVIDES REDUNDANCY FOR VALVE STATUS. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11059 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 08, S34  
PART NUMBER: 33V73A8 J4-6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11060 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE MANUALLY. GPC OPEN/CLOSE COMMANDS STILL OPERABLE. LOSS OF REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11061 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM MDM FF3 STIMULI. LOSE MANUAL CLOSE INHIBIT TO THE TYPE I (J4-71) DRIVER WITH MDM FF3 STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11062 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE WITH GPC. MANUAL OPEN/CLOSE COMMANDS FROM SWITCH 34 STILL OPERABLE. LOSS OF ALL REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11063 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J13-3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM SWITCH STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11064 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J7-R

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY INHIBIT THE DRIVER TO GROUND, THUS PREVENTING THE VALVE TO OPEN OR CLOSE. GPC CAPABILITY TO INHIBIT GROUND DRIVER STILL OPERABLE. LOSS OF THIS REDUNDANCY TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11065

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J7-R

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM MDM FF2 STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11066 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J7-S

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE THE GPC CLOSE INHIBIT TO THE GROUND DRIVER, WHICH PREVENTS THE VALVE TO CLOSE. MANUAL INHIBIT AND GPC OPEN INHIBIT STILL OPERABLE. LOSS OF REDUNDANCY TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11067	ABORT:	3/3

ITEM: DIODE  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:            AV BAY 6, PCA 3  
PART NUMBER:    83V76A24 J7-S

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT.    PROVIDES ISOLATION FROM SWITCH 34 AND MDM FF2 "OPEN" STIMULI.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11068 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J7-T

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE THE GPC OPEN INHIBIT TO THE GROUND DRIVER, WHICH PREVENTS THE VALVE TO BE OPENED. MANUAL INHIBIT AND GPC CLOSE INHIBIT STILL OPERABLE. LOSS OF REDUNDANCY TO OPEN THE ISOLATION VALVES MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11069

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:            AV BAY 6, PCA 3  
PART NUMBER:    83V76A24 J7-T

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT.    PROVIDES ISOLATION FROM SWITCH 34 AND MDM FF2 "CLOSE" STIMULI.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11070 ABORT: 2/2

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 83V76A24 J7-e

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVES EITHER MANUALLY OR WITH GPC. THIS CAUSES LOSS OF MISSION OPERATIONS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11071	ABORT:	3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                AV BAY 6, PCA 3  
PART NUMBER:        83V76A24 J7-e

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT.    PROVIDES ISOLATION FOR THE MDM OF1 AND RPC 29 STIMULI.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11072 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVs
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: MANIFOLD 5, OX ISOL VLV  
PART NUMBER: 22V42LV258 J1-1 (BOTH DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSS OF ONE DIODE HAS NO EFFECT. LOSS OF SECOND DIODE (THE REDUNDANCY) PREVENTS FURTHER OXIDIZER VALVE MOVEMENT. IF VALVE IS OPEN, INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11073	ABORT:	3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            MANIFOLD 5, OX ISOL VLV  
PART NUMBER:    22V42LV258 J1-1 (BOTH DIODES)

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM ERRONEOUS STIMULI TO THE OXIDIZER SOLENOIDS.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11074 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: MANIFOLD 5, FU ISOL VLV  
PART NUMBER: 22V42LV257 J1-1 (BOTH DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSS OF ONE DIODE HAS NO EFFECT. LOSS OF SECOND DIODE (THE REDUNDANT) PREVENTS FURTHER FUEL VALVE MOVEMENT. IF VALVE IS OPEN, INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11075 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: MANIFOLD 5, FU ISOL VLV  
PART NUMBER: 22V42LV257 J1-1 (BOTH DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM ERRONEOUS STIMULI TO THE FUEL SOLENOIDS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11076 ABORT: 3/1R

ITEM: CIRCUIT BREAKER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) CIRCUIT BREAKER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PANEL R15  
PART NUMBER: 32V73A15 CB 73

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO INHIBIT GROUND DRIVER MANUALLY. GPC COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY PREVENTS FURTHER VALVE MOVEMENT. IF VALVE IS CLOSED, VRCS IS NOT OPERABLE (LOSS OF MISSION). IF VALVE IS OPEN, INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF THRUST LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11077	ABORT:	3/3

ITEM:                   CIRCUIT BREAKER  
FAILURE MODE:       FAILS SHORT

LEAD ANALYST: D. HARTMAN                   SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) CIRCUIT BREAKER
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:   A [    ]            B [    ]            C [    ]

LOCATION:                PANEL R15  
PART NUMBER:       32V73A15 CB 73

CAUSES:   CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.   LOSE CAPABILITY TO MANUALLY OPEN CIRCUIT BREAKER.

REFERENCES:   ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11078 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVs
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: MANIFOLD 5, OX & FU ISOL VLV  
PART NUMBER: 22V42LV158 J1-3, 9; 22V42LV157 J1-3, 9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR ISOLATION VALVE OPEN OR CLOSE STATUS. MANIFOLD STATUS (MDM FF3) PROVIDES LATEST MICROSWITCH DISCRETE INFORMATION OF VALVE LOCATION. VRCS MAY BE LOST IF VALVES ARE THOUGHT TO BE CLOSED (LOSS OF MISSION). ALSO LOSE INHIBITS TO THE TYPE III "OPEN" AND "CLOSE" HYBRID DRIVERS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11079 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: MANIFOLD 5, OX & FU ISOL VLV  
PART NUMBER: 22V42LV158 J1-3, 9; 22V42LV157 J1-3, 9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR OPEN OR CLOSE STATUS. VRCS MAY BE LOST IF VALVES ARE THOUGHT TO BE CLOSED (LOSS OF MISSION). ALSO LOSE INHIBITS TO THE TYPE III "OPEN" OR "CLOSE" HYBRID DRIVERS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/1R
MDAC ID:	11080	ABORT:	3/1R

ITEM: HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

**BREAKDOWN HIERARCHY:**

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) HE OX & FU ISOL VLV A OR B SWITCH 16 OR 17
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                PNL 08  
PART NUMBER:        33V73A8S16; S17

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

**EFFECTS/RATIONALE:**

LOSE CAPABILITY TO CLOSE ISOLATION VALVE. REDUNDANCY TO CLOSE VALVE AVAILABLE WITH GPC COMMANDS. LOSS OF THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF THE HELIUM SYSTEM LEADING TO POSSIBLE OVERPRESSURIZATION AND RUPTURE OF PROPELLANT TANKS AND LINES.

**REFERENCES:**

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/1R
MDAC ID:	11081	ABORT:	2/1R

ITEM: HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) HE OX & FU ISOL VLV A OR B SWITCH 16 OR 17
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 08  
PART NUMBER:                33V73A8S16; S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE CLOSED, SHORT ACROSS CLOSE CONTACTS 5, 6 WILL PREVENT FURTHER VALVE MOVEMENT. THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY PREVENTS CAPABILITY TO EXPEL PROPELLANTS WHICH LEADS TO C.G. SAFETY BOUNDARY EXCEEDANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11082 ABORT: 2/1R

ITEM: HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) HE OX & FU ISOL VLV A OR B SWITCH 16 OR 17
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08  
PART NUMBER: 33V73A8S16; S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE CLOSED, SHORT ACROSS CLOSE CONTACTS WILL PREVENT ANY FURTHER MOVEMENT OF THAT VALVE. THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY PREVENTS CAPABILITY TO EXPEL PROPELLANTS WHICH LEADS TO C.G. SAFETY BOUNDARY EXCEEDANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11083 ABORT: 3/3

ITEM: HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) HE OX & FU ISOL VLV A OR B SWITCH 16 OR 17
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 08  
PART NUMBER: 33V73A8S16; S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11084 ABORT: 3/1R

ITEM: HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) HE OX & FU ISOL VLV A OR B SWITCH 16 OR 17
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08  
PART NUMBER: 33V73A8S16; S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 1 AMP FUSE AND WILL PREVENT FURTHER SWITCH MOVEMENT. REDUNDANCY PROVIDED WITH THE GPC COMMANDS. LOSS OF THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY PREVENTS CAPABILITY TO EXPEL PROPELLANTS IN EFFORTS TO MEET C.G. CONSTRAINTS.

REFERENCES:



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/1R
MDAC ID:	11085	ABORT:	3/1R

ITEM: OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 1/2
- 5) OX & FU TK ISOL VLV 1/2 SWITCH 23
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ NA ]                      C [ P ]

LOCATION:                      PNL 08 S23  
PART NUMBER:                33V73A8S23

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE CAPABILITY TO MANUALLY CONTROL THE VALVES WITH THE SWITCH. REDUNDANCY IS PROVIDED BY THE MDM COMMANDS. LOSS OF THIS REDUNDANCY PREVENTS CLOSING/OPENING THE ISOLATION VALVE. FAILURE TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. FAILURE TO OPEN THE ISOLATION VALVE COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS FORWARD RCS ACTIVITY WHICH LEADS TO INABILITY TO EXPEL PROPELLANTS TO MEET C.G. SAFETY BOUNDARIES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11086 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 1/2
- 5) OX & FU TK ISOL VLV 1/2 SWITCH 23
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 08 S23  
PART NUMBER: 33V73A8S23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CONTROL THE VALVES WITH THE SWITCH. REDUNDANCY IS PROVIDED BY THE MDM COMMANDS. LOSS OF THIS REDUNDANCY PREVENTS CLOSING/OPENING THE ISOLATION VALVE. FAILURE TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. FAILURE TO OPEN THE ISOLATION VALVE COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS FORWARD RCS ACTIVITY WHICH LEADS TO INABILITY TO EXPEL PROPELLANTS TO MEET C.G. SAFETY BOUNDARIES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11087 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 1/2
- 5) OX & FU TK ISOL VLV 1/2 SWITCH 23
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PNL 08 S23  
PART NUMBER: 33V73A8S23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WHILE IN THE GPC POSITION, A SHORT ACROSS OPEN CONTACTS 1, 2 WILL OPEN THE VALVE. THIS FAILURE, WITH THE LOSS OF ALL REDUNDANCY, COULD PREVENT ISOLATION OF A THRUSTER LEAK WHICH LEADS TO LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11088 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 1/2
- 5) OX & FU TK ISOL VLV 1/2 SWITCH 23
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S23  
PART NUMBER: 33V73A8S23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE IS CLOSED IN ORDER TO ISOLATE A LEAK, INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS LEAK WHICH LEADS TO LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11089 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SHORT TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 1/2
- 5) OX & FU TK ISOL VLV 1/2 SWITCH 23
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S23  
PART NUMBER: 33V73A8S23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW THE 1 AMP FUSE. LOSE CAPABILITY TO MANUALLY CONTROL THE VALVES WITH THE SWITCH. REDUNDANCY IS PROVIDE BY THE MDM COMMANDS. LOSS OF THIS REDUNDANCY PREVENTS CLOSING/OPENING THE ISOLATION VALVE. FAILURE TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. FAILURE TO OPEN THE ISOLATION VALVE COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS FORWARD RCS ACTIVITY WHICH LEADS TO INABILITY TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11090 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 3/4/5 SWITCH 24  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 3/4/5
- 5) OX & FU TK ISOL VLV 3/4/5 SWITCH 24
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S24  
PART NUMBER: 33V73A8S24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CONTROL THE VALVES WITH THE SWITCH. REDUNDANCY IS PROVIDED BY THE MDM COMMANDS. LOSS OF THIS REDUNDANCY PREVENTS CLOSING (OPENING) THE ISOLATION VALVE. FAILURE TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. FAILURE TO OPEN ISOLATION VALVE COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS FORWARD RCS ACTIVITY WHICH LEAD TO INABILITY TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11091 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 3/4/5 SWITCH 24  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 3/4/5
- 5) OX & FU TK ISOL VLV 3/4/5 SWITCH 24
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S24  
PART NUMBER: 33V73A8S24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CONTROL THE VALVES WITH THE SWITCH. REDUNDANCY IS PROVIDED BY THE MDM COMMANDS. LOSS OF THIS REDUNDANCY PREVENTS OPENING (CLOSING) THE ISOLATION VALVE. FAILURE TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. FAILURE TO OPEN THE ISOLATION VALVE COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS FORWARD RCS ACTIVITY WHICH LEADS TO INABILITY TO EXPEL PROPELLANTS TO MEET C.G. SAFETY BOUNDARIES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11092 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 3/4/5 SWITCH 24  
FAILURE MODE: SWITCH SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 3/4/5
- 5) OX & FU TK ISOL VLV 3/4/5 SWITCH 24
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S24  
PART NUMBER: 33V73A8S24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WHILE IN THE GPC POSITION, A SHORT ACROSS OPEN CONTACTS 1, 2 WILL OPEN THE VALVE. THIS FAILURE, COUPLED WITH THE LOSS OF ALL REDUNDANCY, COULD PREVENT ISOLATION OF A THRUSTER LEAK WHICH LEADS TO LOSS OF CREW/VEHICLE.

REFERENCES:



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11093 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 3/4/5 SWITCH 24  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 3/4/5
- 5) OX & FU TK ISOL VLV 3/4/5 SWITCH 24
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S24  
PART NUMBER: 33V73A8S24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE WAS CLOSED IN ORDER TO ISOLATE A LEAK, INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS LEAK WHICH LEADS TO LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11094 ABORT: 3/1R

ITEM: OX & FU TK ISOL VLV 3/4/5 SWITCH 24  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL VLV 3/4/5
- 5) OX & FU TK ISOL VLV 3/4/5 SWITCH 24
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S24  
PART NUMBER: 33V73A8S24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CONTROL THE VALVES WITH THE SWITCH. REDUNDANCY IS PROVIDED BY THE MDM COMMANDS. LOSS OF THIS REDUNDANCY PREVENTS CLOSING (OPENING) THE ISOLATION VALVE. FAILURE TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. FAILURE TO OPEN THE ISOLATION VALVE COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS FORWARD RCS ACTIVITY WHICH LEADS TO INABILITY TO EXPEL PROPELLANTS TO MEET C.G. SAFETY MARGINS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11095 ABORT: 3/1R

ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH 30  
FAILURE MODE: FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, OX & FU ISOL VLVS
- 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH 30
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S30  
PART NUMBER: 33V73A8S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN (CLOSE) THE VALVE. GPC COMMANDS PROVIDE REDUNDANCY TO OPEN (CLOSE) THE VALVE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS. INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. BOTH WARRANT LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11096 ABORT: 2/1R

ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH 30  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, OX & FU ISOL VLVS
- 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH 30
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S30  
PART NUMBER: 33V73A8S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CLOSE CONTACTS, CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/1R
MDAC ID:	11097	ABORT:	2/1R

ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH 30  
FAILURE MODE: SWITCH SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, OX & FU ISOL VLVS
- 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH 30
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]            B [ P ]            C [ P ]

LOCATION:            PNL 08 S30  
PART NUMBER:    33V73A8S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11098 ABORT: 3/3

ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH 30  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, OX & FU ISOL VLVS
- 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH 30
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S30  
PART NUMBER: 33V73A8S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH INADVERTENTLY CLOSES, THE JETS ON THE MANIFOLD WILL BE LOST. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 3. LOSS OF ALL REDUNDANCY CAUSE LOSS OF JETS REQUIRED FOR ET SEPARATION.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11099 ABORT: 2/1R

ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH 30  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, OX & FU ISOL VLVS
- 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH 30
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S30  
PART NUMBER: 33V73A8S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1A FUSE WILL BLOW CAUSING THE INABILITY TO OPEN/CLOSE THE VALVE MANUALLY. GPC COMMANDING OF THE VALVE STILL AVAILABLE. LOSS OF THIS COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11100 ABORT: 3/1R

ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH 31  
FAILURE MODE: SWITCH FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, OX & FU ISOL VLVS
- 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 31
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S31  
PART NUMBER: 33V73A8S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN (CLOSE) THE VALVE. GPC COMMANDS PROVIDE REDUNDANCY TO OPEN (CLOSE) THE VALVE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL PROPELLANT TO MEET C.G. CONSTRAINTS. INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. BOTH WARRANT LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11101 ABORT: 2/1R

ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH 31  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, OX & FU ISOL VLVS
- 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 31
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S31  
PART NUMBER: 33V73A8S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CLOSE CONTACTS, CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL BOUNDARIES TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11102 ABORT: 2/1R

ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH 31  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, OX & FU ISOL VLVS
- 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 31
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S31  
PART NUMBER: 33V73A8S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11103 ABORT: 3/1R

ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH 31  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, OX & FU ISOL VLVS
- 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 31
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S31  
PART NUMBER: 33V73A8S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
IF VALVE INADVERTENTLY CLOSES, THE JETS ON THAT MANIFOLD WILL BE LOST. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11104 ABORT: 2/1R

ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH 31  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, OX & FU ISOL VLVS
- 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 31
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S31  
PART NUMBER: 33V73A8S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW CAUSING THE INABILITY TO OPEN/CLOSE THE VALVE MANUALLY. GPC COMMANDING OF THE VALVE STILL AVAILABLE. LOSS OF THIS REDUNDANCY COUPLED WITH THE LOSS OF ALL HARDWARE PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/1R
MDAC ID:	11105	ABORT:	3/1R

ITEM: MANIFOLD 3, OX & FU ISOL VLV SWITCH 32  
FAILURE MODE: SWITCH FAIL OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, OX & FU ISOL VLVS
- 5) MANIFOLD 3, OX & FU ISOL VLV SWITCH 32
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 08 S32  
PART NUMBER:                33V73A8S32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN (CLOSE) THE VALVE GPC COMMANDS PROVIDE REDUNDANCY TO OPEN (CLOSE) THE VALVE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET C.G. CONSTRAINTS. INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. BOTH WARRANT LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11106 ABORT: 2/1R

ITEM: MANIFOLD 3, OX & FU ISOL VLV SWITCH 32  
FAILURE MODE: SWITCH FAIL SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, OX & FU ISOL VLVS
- 5) MANIFOLD 3, OX & FU ISOL VLV SWITCH 32
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S32  
PART NUMBER: 33V73A8S32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CLOSE CONTACTS, CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11107 ABORT: 2/1R

ITEM: MANIFOLD 3, OX & FU ISOL VLV SWITCH 32  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, OX & FU ISOL VLVS
- 5) MANIFOLD 3, OX & FU ISOL VLV SWITCH 32
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S32  
PART NUMBER: 33V73A8S32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11108 ABORT: 3/1R

ITEM: MANIFOLD 3, OX & FU ISOL VLV SWITCH 32  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, OX & FU ISOL VLV
- 5) MANIFOLD 3, OX & FU ISOL VLV SWITCH 32
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S32  
PART NUMBER: 33V73A8S32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH INADVERTENTLY CLOSES JETS ON THIS MANIFOLD WILL BE LOST. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1. LOSS OF THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY PREVENT CONTROL OF ET SEPARATION.

REFERENCES: VS70-943099 REV B EO B12, CE, DE





INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11110 ABORT: 3/1R

ITEM: MANIFOLD 4, OX & FU ISOL VLV SWITCH 33  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, OX & FU ISOL VLVS
- 5) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S33  
PART NUMBER: 33V73A8S33

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN (CLOSE) THE VALVE. GPC COMMANDS PROVIDE REDUNDANCY TO OPEN (CLOSE) THE VALVE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET C.G. CONSTRAINTS. INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. BOTH WARRANT LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11111 ABORT: 2/1R

ITEM: MANIFOLD 4, OX & FU ISOL VLV SWITCH 33  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, OX & FU ISOL VLVS
- 5) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S33  
PART NUMBER: 33V73A8S33

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CLOSE CONTACTS, CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/1R
MDAC ID:	11112	ABORT:	2/1R

ITEM: MANIFOLD 4, OX & FU ISOL VLV SWITCH 33  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, OX & FU ISOL VLVS
- 5) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 08 S33  
PART NUMBER:                33V73A8S33

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHEETS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. INABILITY TO OPEN THE VALVE COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11113 ABORT: 3/1R

ITEM: MANIFOLD 4, OX & FU ISOL VLV SWITCH 33  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, OX & FU ISOL VLVS
- 5) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S33  
PART NUMBER: 33V73A8S33

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF VALVE INADVERTENTLY CLOSES LOSE JETS ON THIS MANIFOLD.  
REDUNDANCY PROVIDED BY JETS ON MANIFOLD 2. LOSS OF THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED FOR ET SEPARATION.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11114 ABORT: 2/1R

ITEM: MANIFOLD 4, OX & FU ISOL VLV SWITCH 33  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, OX & FU ISOL VLVS
- 5) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 08 S33  
PART NUMBER: 33V73A8S33

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW CAUSING THE INABILITY TO OPEN/CLOSE THE VALVE MANUALLY. GPC COMMANDING OF THE VALVE STILL AVAILABLE. LOSS OF THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11115 ABORT: 2/1R

ITEM: RJDF1B F1 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S7  
PART NUMBER: 33V73A14S7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO INHIBIT RPC 38. RPC 38 OUTPUT REQUIRED TO TURN ON DRIVER POWER, BITE DRIVER POWER, AND ELECTRONIC POWER. THIS CAUSES LOSS OF MANIFOLD 1 JETS. REDUNDANCY PROVIDED BY MANIFOLD 3 JETS WHICH FIRE IN THE SAME DIRECTION. LOSS OF ALL REDUNDANCY MAY AFFECT DE-ORBIT FRCS DUMP TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11116	ABORT:	3/3

ITEM: RJDF1B F1 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                      PNL 014 S7  
PART NUMBER:                33V73A14S7

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
THIS SWITCH FAILED SHORT CAUSES NO EFFECT.    OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES:    VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11117 ABORT: 3/3

ITEM: RJDF1B F1 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 014 S7  
PART NUMBER: 33V73A14S7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

THIS SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11118 ABORT: 1/1

ITEM: RJDF1B F1 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH INADVERTENTLY OPENS (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S7  
PART NUMBER: 33V73A14S7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH IS INADVERTENTLY SWITCHED OFF, JETS ON MANIFOLD 1 WILL NOT BE ABLE TO FIRE. DURING FLIGHT, SWITCH IS EASILY CORRECTABLE. DURING ASCENT, JETS ON OTHER MANIFOLDS PROVIDE REDUNDANCY. DURING RTLS/TAL, IF SWITCH IS INADVERTENTLY SWITCHED OFF, IT MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11119 ABORT: 1/1

ITEM: RJDF1B F1 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S7  
PART NUMBER: 33V73A14S7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW. THIS WILL CAUSE LOSS OF MANIFOLD 1 JETS. REDUNDANCY PROVIDED BY MANIFOLD 3 JETS WHICH FIRE IN THE SAME DIRECTION. LOSS OF ALL REDUNDANCY MAY AFFECT DE-ORBIT FRCS DUMP AND CAUSE LOSS OF JETS FOR ET SEPARATION. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11120 ABORT: 1/1

ITEM: RJDF1B F1 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S8  
PART NUMBER: 33V73A14S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO INHIBIT RELAY K11 AND HYBRID DRIVER, BOTH OF WHICH ARE REQUIRED TO PROVIDE JET DRIVER POWER. THIS CAUSES LOSS OF MANIFOLD 1 JETS AND A REDUNDANCY PATH FOR MANIFOLD 3 JETS. REDUNDANCY FOR MANIFOLD 1 JETS CAN STILL BE PROVIDED BY REMAINING REDUNDANT ELECTRICAL PATH FOR MANIFOLD 3 JETS. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP REQUIRED TO MEET C.G. CONSTRAINTS. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11121	ABORT:	3/3

ITEM: RJDF1B F1 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL 014 S8  
PART NUMBER:    33V73A14S8

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ALONE CAUSES NO EFFECT.    REQUIRES OTHER FAILURES TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES:    VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11122 ABORT: 3/3

ITEM: RJDF1B F1 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 014 S8  
PART NUMBER: 33V73A14S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11123 ABORT: 1/1

ITEM: RJDF1B F1 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH INADVERTENTLY FAILS OPEN/CLOSED (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S8  
PART NUMBER: 33V73A14S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH IS INADVERTENTLY SWITCHED OFF, JETS ON MANIFOLD 1 WILL NOT BE ABLE TO FIRE. DURING FLIGHT, SWITCH IS EASILY CORRECTABLE. DURING ASCENT, JETS ARE USED FOR ET SEPARATION. REDUNDANCY PROVIDED BY OTHER MANIFOLDS. DURING RTLS/TAL, IT MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11124 ABORT: 1/1

ITEM: RJDF1B F1 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) RJDF1B F1 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S8  
PART NUMBER: 33V73A14S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE, THE 2 AMP (OR 1 AMP) FUSE WILL BLOW. EITHER WILL CAUSE LOSS OF MANIFOLD 1 JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 3. JETS ARE REQUIRED FOR ET SEPARATION AND TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANT.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11126 ABORT: 3/3

ITEM: RJDF1A F2 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 015 S7  
PART NUMBER: 33V73A15S7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ALONE CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11127 ABORT: 3/3

ITEM: RJDF1A F2 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 015 S7  
PART NUMBER: 33V73A15S7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THURSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11128 ABORT: 1/1

ITEM: RJDF1A F2 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 015 S7  
PART NUMBER: 33V73A15S7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH IS INADVERTENTLY SWITCHED OFF, JETS ON MANIFOLD 2 WILL NOT BE ABLE TO FIRE. DURING FLIGHT, SWITCH IS EASILY CORRECTABLE. DURING ASCENT, JETS ARE REQUIRED FOR ET SEPARATION. MANIFOLD 4 JETS PROVIDE REDUNDANCY. DURING RTLS/TAL IT MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/1R
MDAC ID:	11129	ABORT:	1/1

ITEM: RJDF1A F2 MANIFOLD LOGIC SWITCH 7  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD LOGIC SWITCH 7
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 015 S7  
PART NUMBER:                33V73A15S7

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THIS WILL BLOW THE 1 AMP FUSE. THIS WILL CAUSE LOSS OF MANIFOLD 2 JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 3, AND 4. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSE LOSS OF JETS FOR ET SEPARATION. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS.

REFERENCES:    VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11131 ABORT: 3/3

ITEM: RJDF1A F2 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 015 S8  
PART NUMBER: 33V73A15S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11132 ABORT: 3/3

ITEM: RJDF1A F2 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 015 S8  
PART NUMBER: 33V73A15S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11133 ABORT: 1/1

ITEM: RJDF1A F2 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 015 S8  
PART NUMBER: 33V73A15S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH IS INADVERTENTLY SWITCHED OFF, LOSE JETS ON MANIFOLD 2. SWITCH POSITION IS EASILY CORRECTABLE. DURING FLIGHT JETS ARE REQUIRED FOR ET SEPARATION. REDUNDANCY PROVIDED BY MANIFOLD 4. DURING RTLS/TAL, IT MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11134 ABORT: 1/1

ITEM: RJDF1A F2 MANIFOLD DRIVER SWITCH 8  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) RJDF1A F2 MANIFOLD DRIVER SWITCH 8
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 015 S8  
PART NUMBER: 33V73A15S8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, 1 AMP FUSE WILL BLOW. THIS WILL CAUSE LOSS OF MANIFOLD 2 JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1, 3, AND 4. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSE LOSS OF JETS FOR ET SEPARATION. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/1R
MDAC ID:	11135	ABORT:	1/1

ITEM: RJDF2A F3 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]            B [ P ]            C [ P ]

LOCATION:            PNL 016 S5  
PART NUMBER:    33V73A16S5

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE CAPABILITY TO TURN ON DRIVER POWER, BITE DRIVER POWER, AND ELECTRONIC POWER. THIS CAUSES LOSS OF MANIFOLD 3 JETS. REDUNDANCY PROVIDED BY MANIFOLD 1 JETS. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF -Z JETS FOR ET SEPARATION. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS.

REFERENCES:    VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11136 ABORT: 3/3

ITEM: RJDF2A F3 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S5  
PART NUMBER: 33V73A16S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11137 ABORT: 3/3

ITEM: RJDF2A F3 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S5  
PART NUMBER: 33V73A16S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THURSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11138 ABORT: 1/1

ITEM: RJDF2A F3 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S5  
PART NUMBER: 33V73A16S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH IS INADVERTENTLY SWITCHED OFF, JETS ON MANIFOLD 3 WILL NOT BE ABLE TO FIRE. DURING ASCENT, JETS ARE REQUIRED FOR ET SEPARATION. DURING FLIGHT, SWITCH IS EASILY CORRECTABLE. DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11139 ABORT: 1/1

ITEM: RJDF2A F3 MANIFOLD DRIVER SWITCH 5  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD DRIVER SWITCH 5
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S5  
PART NUMBER: 33V73A16S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW. THIS WILL CAUSE LOSS OF MANIFOLD 3 JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1, 3, AND 4. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF -Z JETS REQUIRED FOR ET SEPARATION. DURING RTLS/TAL, MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS.

REFERENCES: VS70-942099 REV D EO D01, AJ; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/1R
MDAC ID:	11140	ABORT:	1/1

ITEM: RJDF2A F3 MANIFOLD DRIVER SWITCH 6  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD DRIVER SWITCH 6
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 016 S6  
PART NUMBER:                33V73A16S6

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO TURN ON DRIVER POWER, BITE DRIVER POWER, AND ELECTRONIC POWER. THIS CAUSES LOSS OF MANIFOLD 3 JETS. REDUNDANCY PROVIDED BY MANIFOLD 1 JETS. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF -Z JETS FOR ET SEPARATION. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS.

REFERENCES:    VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1





INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11142 ABORT: 3/3

ITEM: RJDF2A F3 MANIFOLD DRIVER SWITCH 6  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD DRIVER SWITCH 6
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S6  
PART NUMBER: 33V73A16S6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURE REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11144 ABORT: 1/1

ITEM: RJDF2A F3 MANIFOLD DRIVER SWITCH 6  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) RJDF2A F3 MANIFOLD DRIVER SWITCH 6
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S6  
PART NUMBER: 33V73A16S6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW. THIS WILL CAUSE LOSS OF MANIFOLD 3 JETS. REDUNDANCY PROVIDED BY MANIFOLD 1 JETS. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF -Z JETS REQUIRED FOR ET SEPARATION. DURING RTLS/TAL, MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11145 ABORT: 2/1R

ITEM: RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 12  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 12
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S12  
PART NUMBER: 33V73A16S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO TURN ON DRIVER POWER, BITE DRIVER POWER, AND ELECTRONIC POWER FOR BOTH MANIFOLDS 4 AND 5 JETS. MANIFOLD 4 JET REDUNDANCY FOR -Y AND -Z THRUST PROVIDED BY MANIFOLD 2 JETS. NO REDUNDANCY PROVIDED FOR MANIFOLD 5 JETS. LOSS OF ALL REDUNDANT -Y AND -Z THRUST PREVENTS FRCS DUMP REQUIRED TO EXPEL ENOUGH PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION. LOSS OF MANIFOLD 5 JETS (VERNIERS) MAY CAUSE LOSS OF MISSION.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11146 ABORT: 3/3

ITEM: RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 12  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 12
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S12  
PART NUMBER: 33V73A16S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11147 ABORT: 3/3

ITEM: RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 12  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 12
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	1/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S12  
PART NUMBER: 33V73A16S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11148 ABORT: 2/1R

ITEM: RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 12  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S12  
PART NUMBER: 33V73A16S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH IS INADVERTENTLY TURNED OFF, LOSE JETS ON MANIFOLD 4 AND 5. MANIFOLD 4 JETS USED DURING ASCENT (REDUNDANCY PROVIDED FOR ET SEPARATION BY JETS ON MANIFOLD 2). SWITCH IS EASILY CORRECTABLE ON-ORBIT (NO EFFECT). DURING RTLS/TAL, MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/1R
MDAC ID:	11149	ABORT:	2/1R

ITEM: RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 12  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD LOGIC SWITCH 12
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:            PNL 016 S12  
PART NUMBER:    33V73A16S12

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 1 AMP FUSE. LOSE CAPABILITY TO TURN ON DRIVER POWER, BITE DRIVER POWER, AND ELECTRONIC POWER FOR BOTH MANIFOLDS 4 AND 5 JETS. MANIFOLD 4 JET REDUNDANCY FOR -Y AND -Z THRUST PROVIDED BY MANIFOLD 2 JETS. NO REDUNDANCY PROVIDED FOR MANIFOLD 5 JETS. LOSS OF ALL REDUNDANT -Y AND -Z THRUST PREVENTS FRCS DUMP REQUIRED TO EXPEL ENOUGH PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION. LOSS OF MANIFOLD 5 JETS (VERNIERS) MAY CAUSE LOSS OF MISSION.

REFERENCES:    VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11150 ABORT: 1/1

ITEM: RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S13  
PART NUMBER: 33V73A16S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO TURN ON DRIVER POWER FOR MANIFOLD 4 JETS AND LOSE REDUNDANCY PATH FOR DRIVER POWER TO MANIFOLD 3 JETS. MANIFOLD 4 JET REDUNDANCY FOR -Y AND -Z THRUST PROVIDED BY MANIFOLD 2 JETS. LOSS OF ALL REDUNDANCY -Y AND -Z THRUST PREVENTS FRCS DUMP REQUIRED TO EXPEL ENOUGH PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11151 ABORT: 3/3

ITEM: RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S13  
PART NUMBER: 33V73A16S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11152 ABORT: 3/3

ITEM: RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S13  
PART NUMBER: 33V73A16S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT CAUSES NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11153 ABORT: 1/1

ITEM: RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S13  
PART NUMBER: 33V73A16S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH INADVERTENTLY TURNS OFF, LOSE JETS ON MANIFOLD 4 AND A REDUNDANCY PATH FOR DRIVER POWER TO MANIFOLD 3 JETS. MANIFOLD 4 JETS USED DURING ASCENT (REDUNDANCY PROVIDED FOR ET SEPARATION BY JETS ON MANIFOLD 2). SWITCH IS EASILY CORRECTABLE ON-ORBIT (NO EFFECT). FAILURE DURING RTLS/TAL MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11154 ABORT: 1/1

ITEM: RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4/5, RJDF
- 5) RJDF2A F4/F5 MANIFOLD DRIVER SWITCH 13
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	1/1
LIFTOFF:	3/1R		TAL:	1/1
ONORBIT:	3/2R		AOA:	2/1R
DEORBIT:	2/1R		ATO:	2/1R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S13  
PART NUMBER: 33V73A16S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE IT WILL BLOW THE 2 AMP FUSE. LOSE CAPABILITY TO TURN ON DRIVER POWER FOR MANIFOLD 4 JETS AND LOSE REDUNDANCY PATH FOR DRIVER POWER TO MANIFOLD 3 JETS. MANIFOLD 4 JET REDUNDANCY FOR -Y AND -Z THRUST PROVIDED BY MANIFOLD 2 JETS. LOSS OF ALL REDUNDANT -Y AND -Z THRUST PREVENTS FRCS DUMP REQUIRED TO EXPEL ENOUGH PROPELLANTS TO MEET C.G. CONSTRAINTS AND CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION. FAILURE DURING RTLS/TAL MAY CAUSE LOSS OF CREW/VEHICLE DUE TO INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	2/2
MDAC ID:	11155	ABORT:	3/3

ITEM: RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

**BREAKDOWN HIERARCHY:**

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 5, RJDF
- 5) RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL 016 S15  
PART NUMBER:    33V73A16S15

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

**EFFECTS/RATIONALE:**

FAILURE WILL RESULT IN THE LOSS OF DRIVER POWER TO THE L5/F5/R5, RESULTING IN LOSS OF THE VERNIER RCS, AND MAY AFFECT ON-ORBIT OPERATIONS.

REFERENCES:    VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11156 ABORT: 3/3

ITEM: RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 5, RJDF
- 5) RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S15  
PART NUMBER: 33V73A16S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT HAS NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11157 ABORT: 3/3

ITEM: RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 5, RJDF
- 5) RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S15  
PART NUMBER: 33V73A16S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT HAS NO EFFECT. OTHER FAILURES REQUIRED TO FIRE A THRUSTER INADVERTENTLY.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11158 ABORT: 3/3

ITEM: RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 5, RJDF
- 5) RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S15  
PART NUMBER: 33V73A16S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. SWITCH IS EASILY CORRECTABLE.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11159 ABORT: 3/3

ITEM: RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 5, RJDF
- 5) RJDF2B L5/F5/R5 MANIFOLD DRIVER SWITCH 15
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S15  
PART NUMBER: 33V73A16S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, 1 AMP FUSE WILL BLOW. FAILURE WILL RESULT IN THE LOSS OF DRIVER POWER TO THE L5/F5/R5, RESULTING IN LOSS OF THE VERNIER RCS, AND MAY AFFECT ON-ORBIT OPERATIONS.

REFERENCES: VS70-942099 REV D EO D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11160 ABORT: 3/2R

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 14  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 14
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S14  
PART NUMBER: 36V73A14S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 1 MAY FREEZE. THIS CAUSES LOSS OF JETS ON THE MANIFOLD. REDUNDANCY PROVIDED BY MANIFOLD 3 JETS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11161 ABORT: 3/3

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 14  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 14
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S14  
PART NUMBER: 36V73A14S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11162 ABORT: 3/2R

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 14  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 14
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S14  
PART NUMBER: 36V73A14S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 1 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY MANIFOLD 3 JETS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11163 ABORT: 3/3

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 14  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 14
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S14  
PART NUMBER: 36V73A14S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11164 ABORT: 3/2R

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 14  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 14
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S14  
PART NUMBER: 36V73A14S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 7.5 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 1 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 3. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11165 ABORT: 3/2R

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 15  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 15
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/2R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S15  
PART NUMBER: 36V73A14S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 2 WILL FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 4. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11166 ABORT: 3/3

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 15  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 15
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S15  
PART NUMBER: 36V73A14S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11167 ABORT: 3/2R

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 15  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 15
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S15  
PART NUMBER: 36V73A14S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 2 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY MANIFOLD 4 JETS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11168 ABORT: 3/3

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 15  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 15
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S15  
PART NUMBER: 36V73A14S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11169 ABORT: 3/2R

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 15  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 15
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S15  
PART NUMBER: 36V73A14S15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 7.5 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 2 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 4. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11170 ABORT: 3/2R

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 16  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 16
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S16  
PART NUMBER: 36V73A14S16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 3 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11171 ABORT: 3/3

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 16  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 16
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S16  
PART NUMBER: 36V73A14S16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11172 ABORT: 3/2R

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 16  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 16
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S16  
PART NUMBER: 36V73A14S16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN MANIFOLD 3 MAY FREEZE, CAUSING LOSS OF JETS.  
REDUNDANCY PROVIDED BY MANIFOLD 1 JETS. LOSS OF ALL REDUNDANCY  
MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11173 ABORT: 3/3

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 16  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 16
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S16  
PART NUMBER: 36V73A14S16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11174 ABORT: 3/2R

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 16  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 16
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S16  
PART NUMBER: 36V73A14S16

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 7.5 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 3 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11175 ABORT: 3/2R

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 17  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 17
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S17  
PART NUMBER: 36V73A14S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 4 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 2. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11176 ABORT: 3/3

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 17  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 17
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S17  
PART NUMBER: 36V73A14S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIOANL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11177 ABORT: 3/2R

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 17  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 17
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S17  
PART NUMBER: 36V73A14S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN MANIFOLD 4 MAY FREEZE, CAUSING LOSS OF JETS.  
REDUNDANCY PROVIDED BY MANIFOLD 2 JETS. LOSS OF ALL REDUNDANCY  
MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11178 ABORT: 3/3

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 17  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 17
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S17  
PART NUMBER: 36V73A14S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11179 ABORT: 3/2R

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 17  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 17
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S17  
PART NUMBER: 36V73A14S17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 5 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 4 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 2. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11180 ABORT: 2/2

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 18  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 18
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S18  
PART NUMBER: 36V73A14S18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 5 MAY FREEZE, CAUSING LOSS OF JETS. NO REDUNDANCY PROVIDED FOR FORWARD VERNIERS, THUS MAY CAUSE LOSS OF MISSION OBJECTIVES.

REFERENCES:



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/3
MDAC ID:	11181	ABORT:	3/3

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 18  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 18
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL A14 S18  
PART NUMBER:    36V73A14S18

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT.    REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11182 ABORT: 2/2

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 18  
FAILURE MODE: SWITCH FAILS SHORT CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 18
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S18  
PART NUMBER: 36V73A14S18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN MANIFOLD 5 MAY FREEZE CAUSING LOSS OF JETS. NO REDUNDANCY PROVIDED FOR FORWARD VERNIERS, THUS MAY CAUSE LOSS OF MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11183 ABORT: 3/3

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 18  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 18
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S18  
PART NUMBER: 36V73A14S18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11184 ABORT: 2/2

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 18  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 18
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S18  
PART NUMBER: 36V73A14S18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 5 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 5 MAY FREEZE, CAUSING LOSS OF JETS. NO REDUNDANCY PROVIDED FOR FORWARD VERNIERS, THUS CAUSING LOSS OF MISSION OBJECTIVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11185 ABORT: 2/2

ITEM: SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) HTR SYSTEM A/B, OX
- 5) SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S3  
PART NUMBER: 36V73A14S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

OXIDIZER AND FUEL PROPELLANTS MAY FREEZE DUE TO INABILITY TO TURN ON PANEL HEATERS. MANEUVERING CAPABILITIES THUS MISSION OBJECTIVES MAY BE LIMITED IN ORDER FOR ORBITER TO WARM TANKS BY FACING THE SUN. NOTE: SWITCH DRAWN INCORRECTLY ON SHEMATIC VS-942099. REFER TO SPACE SHUTTLE SYSTEMS HANDBOOK.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11186 ABORT: 3/3

ITEM: SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) HTR SYSTEM A/B, OX
- 5) SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S3  
PART NUMBER: 36V73A14S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS. NOTE: SWITCH DRAWIN INCORRECTLY ON SCHEMATIC VS70-942099. REFER TO SPACE SHUTTLE SYSTEMS HANDBOOK.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11187 ABORT: 2/2

ITEM: SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) HTR SYSTEM A/B, OX
- 5) SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S3  
PART NUMBER: 36V73A14S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

OXIDIZER AND FUEL PROPELLANTS MAY FREEZE DUE TO INABILITY TO TURN ON PANEL HEATERS. MANEUVERING CAPABILITIES THUS MISSION OBJECTIVES MAY BE LIMITED. NOTE: SWITCH DRAWN INCORRECTLY ON SCHEMATIC VS70-942099. REFER TO SPACE SHUTTLE SYSTEMS HANDBOOK.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11188 ABORT: 3/3

ITEM: SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) THRUSTER
- 3) THERMAL CONTROL SUBSYSTEM
- 4) HTR SYSTEM A/B, OX
- 5) SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S3  
PART NUMBER: 36V73A14S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. NOTE: SWITCH DRAWN INCORRECTLY ON SCHEMATIC VS70-942099. REFER TO SPACE SHUTTLE SYSTEMS HANDBOOK.

REFERENCES:





INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11190 ABORT: 3/3

ITEM: SWITCH ROTARY, RCS/OMS PROPELLANT QUANTITY GAUGE  
FAILURE MODE: FAILS TO SWITCH; (POLES STUCK IN ONE OF THREE  
POSITION OR POLES FAIL TO MAKE CONTACT IN ANY POSITION)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) PROP STOR & DIST SUBSYSTEM
- 4) SWITCH ROTARY, RCS/OMS PROPELLANT QUANTITY GAUGE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 03 S11  
PART NUMBER: 33V73A3S11

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO SELECT OMS/RCS/KIT PROPELLANT QUANTITY FOR VISUAL DISPLAY ON METIER M12. THERE ARE TWO OTHER REDUNDANT MEASUREMENT PATHS FOR THE OMS AND ONE REDUNDANT PATH FOR RCS. IN THE OMS, ONE PATH IS THROUGH THE GPC THE OTHER HARDWIRED TO THE GSE PNL (J207). LOSS OF ALL QUANTITY PATHS HAVE NO EFFECT SINCE GROUND CALCULATIONS WOULD STILL BE AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/2R
MDAC ID:	11191	ABORT:	3/3

ITEM: SWITCH ROTARY, RCS/OMS PRESS  
FAILURE MODE: FAILS TO SWITCH; (POLES STUCK IN ONE OF THREE POSITION OF POLES FAIL TO MAKE CONTACT IN ANY POSITION)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) PROP STOR & DIST SUBSYSTEM
- 4) SWITCH ROTARY, RCS/OMS PRESS
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]            B [ P ]            C [ P ]

LOCATION:            PNL 03 S10  
PART NUMBER:    33V73A3S10

CAUSES:    CONTAMINATION, VIBRATION, PIECE-PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO UTILIZE GAGES M9, M10, AND M11 FOR MONITORING. REDUNDANT MEASUREMENTS ARE AVAILABLE THROUGH GPC AND ARE PART OF THE C&W SYSTEM. THE LOSS OF ALL SIGNAL PATHS FOR OMS RT/LT/KIT PROP ULLAGE, RCS RT/LT/FWD PROP ULLAGE AND RCS RT/LT/FWD HE TK PRESSURE WOULD RESULT IN LOSS OF MISSION FOR SAFETY REASONS SINCE THE ACTUAL STATUS OF THE SYSTEMS ARE UNAVAILABLE.

REFERENCES:    VS70-942099 REV C EO D01; VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11192 ABORT: 3/3

ITEM: METER, RCS/OMS PROPELLANT QUANTITY GAUGE  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) PROP STOR & DIST SUBSYSTEM
- 4) METER, RCS/OMS PROPELLANT QUANTITY GAUGE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 03 S12  
PART NUMBER: 33V73A3S12

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO SELECT OMS/RCS/KIT PROPELLANT QUANTITY FOR VISUAL DISPLAY ON METER M12. THERE ARE TWO OTHER REDUNDANT MEASUREMENT PATHS FOR THE OMS AND ONE REDUNDANT PATH FOR RCS. IN THE OMS, ONE PATH IS THROUGH THE GPC THE OTHER HARDWIRED TO THE GSE PNL (J207). LOSS OF ALL QUANTITY PATHS HAS NO EFFECT SINCE GROUND CALCULATIONS WOULD STILL BE AVAILABLE.

REFERENCES: VS70-943099 REV A EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11193 ABORT: 3/3

ITEM: METER, RT OMS/RCS PRESSURE  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) PROP STOR & DIST SUBSYSTEM
- 4) METER, RT OMS/RCS PRESSURE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/2R	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 03 M11  
PART NUMBER: 33V73A3M11

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

GAGE M11 PROVIDES A FALSE INDICATION OF RT OMS/RCS PROPELLANT ULLAGE AND RT RCS HE TANK PRESSURES. REDUNDANT GPC MEASUREMENT PATHS ARE AVAILABLE (RT OMS FU/OX V43P5321C/V43P5221C, RT RCS FU/OX V42P3116C/V42P3115C, RT RCS HE TANK OX/FU V42P3110C, V42P3112C/V42P3113C, V42P3114C). ERRONEOUS INDICATION FROM LOSS OF ALL REDUNDANCY IN PL & OO PHASES WOULD RESULT IN RT RCS HE TK BEING DECLARED FAILED RESULTING IN A LOSS OF DELTA V AND LOSS OF MISSION CAPABILITY (REF. FLIGHT RULE 6-41), UNLESS SENSOR FAILURE IS DETERMINED.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11194 ABORT: 3/3

ITEM: METER, LT OMS/RCS PRESSURE  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) PROP STOR & DIST SUBSYSTEM
- 4) METER, LT OMS/RCS PRESSURE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/2R	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 03 M9  
PART NUMBER: 33V73A3M9

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

GAGE M9 PROVIDES A FALSE INDICATION OF LT OMS/RCS PROPELLANT ULLAGE AND LT RCS HE TANK PRESSURES. REDUNDANT GPC MEASUREMENT PATHS ARE AVAILABLE (LT OMS FU/OX V43P4321C/V43P4221C, LT RCS FU/OX V42P2116C/V42P2115C, LT RCS HE TANK OX/FU V42P2110C, V42P2112C/V42P2113C, V42P2114C). ERRONEOUS INDICATION FROM LOSS OF ALL REDUNDANCY IN PL & OO PHASES WOULD RESULT IN LT RCS HE TK BEING DECLARED FAILED RESULTING IN A LOSS OF DELTA V AND LOSS OF MISSION CAPABILITY (REF. FLIGHT RULE 6-41), UNLESS SENSOR FAILURE IS DETERMINED.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11195 ABORT: 1/1

ITEM: SIGNAL CONDITIONER OF2  
FAILURE MODE: INCORRECT OR LOSS OF OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTERS, FWD
- 5) SIGNAL CONDITIONER OF2
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: FORWARD BAY 2  
PART NUMBER: 82V75A17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

CHAMBER PRESSURE SENSOR DATA IS ROUTED THROUGH SIGNAL CONDITIONER OF2. DATA RECEIVED AT GPC CAN DESELECT RCS JETS. THEREFORE INCORRECT DATA MAY DESELECT -Z JETS. REDUNDANCY PROVIDED BY JET ON DIFFERENT MANIFOLD. LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED FOR ET SEPARATION.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11196 ABORT: 3/2R

ITEM: SIGNAL CONDITIONER OF3  
FAILURE MODE: INCORRECT OR LOSS OF OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTERS, FWD
- 5) SIGNAL CONDITIONER OF3
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: FORWARD BAY 3A  
PART NUMBER: 83V75A18

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SIGNAL CONDITIONER CONTAINS HELIUM OXIDIZER TANK PRESSURE DATA. POSSIBLE LOSS OF MISSION DUE TO UNCERTAINTY ABOUT QUANTITY OF PROPELLANT.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11197 ABORT: 1/1

ITEM: SIGNAL CONDITIONER OF4  
FAILURE MODE: INCORRECT OR LOSS OF OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) INSTRUMENTATION
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTERS, FWD
- 5) SIGNAL CONDITIONER OF4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	2/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: FORWARD FUSELAGE  
PART NUMBER: 22V75A22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

CHAMBER PRESSURE SENSOR DATA IS ROUTED THROUGH SIGNAL CONDITIONER OF2. DATA RECEIVED AT GPC CAN DESELECT RCS JETS. THEREFORE, INCORRECT DATA MAY DESELECT -Z JETS. REDUNDANCY PROVIDED BY JET ON DIFFERENT MANIFOLD. LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED FOR ET SEPARATION.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: /  
MDAC ID: 11199 ABORT: /

ITEM: JET DRIVER (PRIMARY-ALL)  
FAILURE MODE: JET DRIVER FAILS ON

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTERS, FWD
- 5) JET DRIVER (PRIMARY-ALL)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/	RTLS:	/
LIFTOFF:	/	TAL:	/
ONORBIT:	/	AOA:	/
DEORBIT:	/	ATO:	/
LANDING/SAFING:	/		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: WITHIN RJDF #1 & RJDF #2  
PART NUMBER: 81V79A8 & 82V79A9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

JET DRIVER FAILED ON WILL PROVIDE LATCHING ENERGY TO BI-PROPELLANT VALVES ALLOWING FIRING. CREW MUST ISOLATE PROPELLANT BY CLOSING ASSOCIATED MANIFOLD. INADVERTENT FIRING DURING ANY MISSION PHASE MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: /  
MDAC ID: 11200 ABORT: /

ITEM: JET DRIVER (VERNIER-ALL)  
FAILURE MODE: JET DRIVER FAILS OFF

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTERS, FWD
- 5) JET DRIVER (VERNIER-ALL)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/	RTLS:	/
LIFTOFF:	/	TAL:	/
ONORBIT:	/	AOA:	/
DEORBIT:	/	ATO:	/
LANDING/SAFING:	/		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: WITHIN RJDF #1 & RJDF #2  
PART NUMBER: 81V79A8 & 82V79A9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE JET ASSOCIATED WITH +Y, OR -Y VERNIER THRUST COMPONENT. NO REDUNDANCY PROVIDED. THIS MAY CAUSE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF VERNIERS.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: /  
MDAC ID: 11201 ABORT: /

ITEM: JET DRIVER (VERNIER-ALL)  
FAILURE MODE: JET DRIVER FAILS ON

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTERS, FWD
- 5) JET DRIVER (VERNIER-ALL)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/	RTLS:	/
LIFTOFF:	/	TAL:	/
ONORBIT:	/	AOA:	/
DEORBIT:	/	ATO:	/
LANDING/SAFING:	/		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: WITHIN RJDF #1 & RJDF #2  
PART NUMBER: 81V79A8 & 82V79A9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

JET DRIVER FAILED ON WILL PROVIDE LATCHING ENERGY TO BI-PROPELLANT VALVES ALLOWING FIRING. CREW MUST ISOLATE PROPELLANT BY CLOSING MANIFOLD 5 VALVES. INADVERTENT FIRING DURING ANY MISSION PHASE MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11202 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: 22V42LV102, 22V42LV101  
PART NUMBER: J1-1 (FOUR DIODES), J1-1 (FOUR DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILED OPEN DIODE ASSOCIATED WITH "OPEN" SOLENOID PREVENTS VALVE FROM BEING OPENED. REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF THIS MAY PREVENT FRCS DUMP REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. BOUNDARIES.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/3  
MDAC ID: 11203 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 22V42LV102, 22V42LV101  
PART NUMBER: J1-1 (FOUR DIODES), J1-1 (FOUR DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11204 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 22V42LV102, 22V42LV101  
PART NUMBER: J1-6 (FOUR SWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILED MICROSWITCH PREVENTS ACCURATE VALVE POSITION DATA.  
REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF TALKBACK MAY LEAD TO FALSELY FAILING THE VALVE CLOSED THUS LIMITING ON-ORBIT OPERATIONS.

REFERENCES: VS70-942099 REV D EO D01



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11205 ABORT: 3/1R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL 1/2
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 22V42LV162, 22V42LV161  
PART NUMBER: J1-F (BOTH MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
MICROSWITCH FAILED ACROSS CLOSE CONTACTS WILL NOT ALLOW VALVE TO BE CLOSED. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11206 ABORT: 3/1R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) OX & FU TK ISOL 3/4/5
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 22V42LV163, 22V42LV164  
PART NUMBER: J1-F (BOTH MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

MICROSWITCH FAILED ACROSS CLOSE CONTACTS WILL NOT ALLOW VALVE TO BE CLOSED. THIS, COUPLED WITH THE LOS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11207 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 22V42LV117, 22V42LV118  
PART NUMBER: J1-F (BOTH MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
MICROSWITCH FAILURE ACROSS EITHER CONTACTS WILL PROVIDE AN INACCURATE TALKBACK. THIS MAY LEAD TO FALSELY FAILING THE VALVE CLOSED.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11208 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 22V42LV127, 22V42LV128  
PART NUMBER: J1-F (BOTH MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
MICROSWITCH FAILURE ACROSS EITHER CONTACTS WILL PROVIDE AN INACCURATE TALKBACK DISPLAY. THIS MAY LEAD TO FALSELY FAILING THE VALVE CLOSED.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11209 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 22V42LV137, 22V42LV138  
PART NUMBER: J1-F (BOTH MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
MICROSWITCH FAILURE ACROSS EITHER CONTACTS WILL PROVIDE AN INACCURATE TALKBACK DISPLAY. THIS MAY LEAD TO FALSELY FAILING THE VALVE CLOSED.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/2R  
MDAC ID: 11210 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 22V42LV147, 22V42LV148  
PART NUMBER: J1-F (BOTH MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

MICROSWITCH FAILURE ACROSS EITHER CONTACTS WILL PROVIDE AN INACCURATE TALKBACK DISPLAY. THIS MAY LEAD TO FALSELY FAILING THE VALVE CLOSED.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11211 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2  
PART NUMBER: 81V76A22CR37; 82V76A23CR8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN THE VALVE. REDUNDANCY PROVIDED WITH THE GPC. LOSS OF THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY PREVENTS PROPELLANT TO BE EXPELLED TO MEET C.G. CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11212 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/3	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2  
PART NUMBER: 81V76A22CR13; 82V76A23CR7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN THE VALVE WITH THE GPC. REDUNDANCY PROVIDED WITH MANUAL SWITCH. LOSS OF THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY PREVENTS PROPELLANTS TO BE EXPELLED TO MEET LANDING WEIGHT.

REFERENCES: VS70-942099 REV D EO D01



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11213 ABORT: 1/1

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	1/1
LIFTOFF:	3/1R		TAL:	1/1
ONORBIT:	3/2R		AOA:	2/1R
DEORBIT:	2/1R		ATO:	3/2R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 1, PCA 1  
PART NUMBER: 81V76A22CR35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANIFOLD 1 DRIVER POWER THUS LOSS OF JETS ON MANIFOLD 1.  
REDUNDANCY PROVIDED BY JETS ON MANIFOLD 3. LOSS OF ALL  
REDUNDANCY CAUSES LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO  
MEET C.G. CONSTRAINTS.

REFERENCES: VS70-943099 REV D EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11214 ABORT: 1/1

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 2, PCA 2  
PART NUMBER: 81V76A23CR40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANIFOLD 2 DRIVER POWER THUS LOSS OF JETS ON MANIFOLD 2.  
REDUNDANCY PROVIDED BY JETS ON MANIFOLD 4. LOSS OF ALL  
REDUNDANCY CAUSES LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO  
MEET C.G. CONSTRAINTS.

REFERENCES: VS70-943099 REV D EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11215 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 1, PCA 1  
PART NUMBER: 81V76A22CR49

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 DRIVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS.

REFERENCES: VS70-943099 REV D EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11216 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 3A, PCA 3  
PART NUMBER: 83V76A24A1CR26

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 DRIVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS.

REFERENCES: VS70-943099 REV D EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/1R  
MDAC ID: 11217 ABORT: 1/1

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 3A, PCA 3  
PART NUMBER: 83V76A24A1CR25

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANIFOLD 4 DRIVER POWER THUS LOSS OF JETS ON MANIFOLD 4.  
REDUNDANCY PROVIDED BY JETS ON MANIFOLD 2. LOSS OF ALL  
REDUNDANCY CAUSES LOSS OF JETS REQUIRED TO MEET C.G. CONSTRAINTS.

REFERENCES: VS70-943099 REV D EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11218 ABORT: 2/2

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD F5, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: F BAY 3A, PCA 3  
PART NUMBER: 83V76A24A1CR31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE VERNIER DRIVER POWER WHICH CAUSES LOSS OF VERNIER JETS THUS LOSS OF MISSION.

REFERENCES: VS70-943099 REV D EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11219 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 1, PCA 1  
PART NUMBER: 83V76A22A1CR47

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS.

REFERENCES: VS70-943099 REV D EO B12

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 3/1R  
MDAC ID: 11220 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDF
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: F BAY 1, PCA 1  
PART NUMBER: 83V76A22A1CR48

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND TO EXPEL PROPELLANTS TO MEET C.G. CONSTRAINTS.

REFERENCES: VS70-943099 REV D EO B12

REPORT DATE : 2/26/88

E-262



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: FRCS FLIGHT: 2/2  
MDAC ID: 11221 ABORT: 2/2

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 5, OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: F BAY 1, PCA 1  
PART NUMBER: 81V76A22CRJ7-e

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION THUS LOSS OF MISSION.

REFERENCES: VS70-943099 REV D EO B12

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12001 ABORT: 3/1R

ITEM: FUSE, 1A  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) FUSE, 1A
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 F26; F32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO INHIBIT THE GROUND DRIVER MANUALLY. GROUND DRIVER CAN STILL BE INHIBITED BY MDM FA4. LOSS OF THIS COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12002 ABORT: 3/1R

ITEM: FUSE, 1A  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) FUSE, 1A
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 F25; F31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN OR CLOSE THE ISOLATION VALVE WITH THE SWITCH. GPC VALVE CONTROL IS STILL OPERABLE. LOSS OF ALL REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12003 ABORT: 3/1R

ITEM: MANIFOLD #5, L/R OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVs
- 5) MANIFOLD 5, L/R OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: PNL 07 S26; PNL 07 S31  
PART NUMBER: 33V73A7 S26; S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12004 ABORT: 3/1R

ITEM: MANIFOLD #5, L/R OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 5, L/R OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 S26; S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH LOSS OF HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12005 ABORT: 3/1R

ITEM: MANIFOLD #5, L/R OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 5, L/R OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 S26; S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH LOSS OF HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12006 ABORT: 3/1R

ITEM: MANIFOLD #5, L/R OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/SHORTS (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 5, L/R OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 S26; S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

INADVERTENTLY OPENING THE ISOLATION VALVE PREVENTS ISOLATION OF A THURSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12007 ABORT: 3/1R

ITEM: MANIFOLD #5, L/R OX & FU ISOL VLV SWITCH  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 5, L/R OX & FU ISOL VLV SWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 S26; S31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH SHORT TO CASE WILL BLOW 1 AMP FUSE. LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12008 ABORT: 3/2R

ITEM: RESISTOR, 1.2K 2W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 1.2K 2W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R J8-66, 67; J4-22, 21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR ISOLATION VALVE OPEN AND CLOSE STATUS. MANIFOLD STATUS (MDM FA1; MDM FA2) PROVIDES LATEST MICROSWITCH DISCRETE INFORMATION OF THE VALVES. VRCS MAY NOT BE USED IF VALVES THOUGHT TO BE CLOSED (LOSS OF MISSION). ALSO LOSE INHIBITS TO THE TYPE III "OPEN" AND "CLOSE" HYBRID DRIVERS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12009 ABORT: 3/3

ITEM: RESISTOR, 1.2K 2W  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 1.2K 2W
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R J8-66, 67; J4-22, 21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12010 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133R J7-6; J7-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE CAPABILITY TO MONITOR RPC 15; RPC 10 WITH MDM OA3. DATA NOT MISSION CRITICAL.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12011 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133R J7-3; J7-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE CAPABILITY TO MONITOR RPC 14; RPC 12 WITH MDM OA1. DATA NOT MISSION CRITICAL.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12012 ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R J2-45, J2-20

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE FUEL CLOSED DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FA1, FA2). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOLD STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE VALVE STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12013 ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R J2-40, J2-22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE OXIDIZER OPEN DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FA1, FA2). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOLD STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE VALVE STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12014 ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R J2-41, J2-23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE FUEL OPEN DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FA1, FA2). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOL STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE VALVE STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12015 ABORT: 3/2R

ITEM: RESISTOR, 5.1K 1/4W  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) RESISTOR, 5.1K 1/4W
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R J2-46, J2-21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE OXIDIZER CLOSE DISCRETE INPUT TO THE MANIFOLD STATUS MONITOR (MDM FA1, FA2). MANIFOLD STATUS MONITOR MAY ISSUE A DILEMMA STATE AND SET THE MANIFOLD STATUS TO CLOSED. KEYBOARD ENTRIES ARE REQUIRED TO OVERRIDE THE VALVE STATUS TO OPEN. TALKBACK INDICATOR PROVIDES REDUNDANCY. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12016 ABORT: 3/2R

ITEM: EVENT INDICATOR  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) EVENT INDICATOR
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 DS17; DS22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO VISUALLY MONITOR ISOLATION VALVE OPEN OR CLOSE STATUS. REDUNDANCY IS PROVIDED WITH THE MANIFOLD STATUS MONITOR (MDM FA1, FA3). LOSE OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12017 ABORT: 3/2R

ITEM: EVENT INDICATOR  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) EVENT INDICATOR
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 DS17; DS22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO VISUALLY MONITOR THE ISOLATION OPEN OR CLOSE STATUS. REDUNDANCY IS PROVIDED WITH THE MANIFOLD STATUS MONITOR (MDM FA1, FA3). LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12018 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 RPC15, 10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12019 ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 RPC15, 10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE INHIBIT TO THE TYPE III "OPEN" HYBRID DRIVER.  
DETECTABLE WITH MDM OA3.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12020 ABORT: 2/2

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 RPC14, 12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENT VRCS OPERATION (LOSS OF MISSION). DETECTABLE WITH MDM OA1.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12021 ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) CONTROLLER, REMOTE POWER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 RPC14, 12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE INHIBIT TO THE TYPE III "OPEN" HYBRID DRIVER.  
DETECTABLE WITH MDM OAL.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12022 ABORT: 3/2R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 176, 159 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE VISUAL INDICATION OF VALVE CLOSURE STATUS. ALSO LOSE INHIBIT TO THE TYPE III "CLOSE" HYBRID DRIVER. THE MANIFOLD STATUS MONITOR (MDM FA1, FA2) PROVIDES VALVE POSITION DATA. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED. TYPE III "CLOSE" DRIVER REQUIRES OTHER INHIBITS TO DRIVE IT AND THE GROUND DRIVE MUST BE DRIVEN FOR UNEXPECTED VALVE OPEN OR CLOSE MOVEMENT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12023 ABORT: 3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 176, 159 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE OPEN, TALKBACK WILL DISPLAY BARBERPOLE. VALVE STATUS CAN BE MONITORED WITH MDM FA1, FA2. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OR VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED. ALSO LOSE INHIBIT TO THE TYPE III "CLOSE" DRIVER SO THAT IT CANNOT BE TURNED ON. THIS PREVENTS CLOSURE OF THE VALVE MANUALLY OR WITH THE GPC, THUS PREVENTING ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12024 ABORT: 3/2R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 177, 160 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE VISUAL INDICATION OF VALVE OPEN STATUS. ALSO LOSE AN INHIBIT TO THE TYPE III "OPEN" DRIVER. THE MANIFOLD STATUS MONITOR (MDM FA1, FA2) PROVIDES VALVE POSITION DATA. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED. TYPE III "OPEN" DRIVER REQUIRES OTHER INHIBITS TO DRIVE IT AND THE GROUND DRIVER MUST BE DRIVEN FOR UNEXPECTED VALVE OPEN OR CLOSE MOVEMENT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12025 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 177, 160 TYPE II

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE CLOSED, TALKBACK WILL DISPLAY BARBERPOLE. VALVE STATUS CAN BE MONITORED BY MDM FA1, FA2. ALSO LOSE AN INHIBIT TO THE TYPE III "OPEN" DRIVER SO THAT IT CANNOT BE TURNED ON, THUS NOT ALLOWING THE VALVE TO BE OPENED (LOSS OF MISSION).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12026 ABORT: 3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 178, 161 TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE ISOLATION VALVE WHICH PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12027 ABORT: 3/3

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 178, 161 TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE INHIBITS REQUIRED TO CLOSE THE ISOLATION VALVE. THE GROUND DRIVER MUST BE TURNED ON FOR VALVE MOVEMENT. IF VALVE IS ATTEMPTED TO BE OPENED, BOTH SOLENOIDS WILL CONDUCT (WITH PROPER GROUND DRIVER STIMULI). WITH BOTH SOLENOIDS ENERGIZED, THE VALVE WILL TRANSFER TO OR REMAIN OPEN. BY REMOVING "OPEN" COMMAND, VALVE WILL CLOSE WITH PROPER GROUND STIMULI.

REFERENCES: ECN 102-8023A

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12028 ABORT: 3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 180, 163 TYPE I

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE. ALSO LOSE AN INHIBIT TO OPEN THE ISOLATION VALVE. INABILITY, TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12029 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 180, 163 TYPE I

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. ALSO LOSE AN INHIBIT TO TURN ON RPC 15, 10. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12030 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 179, 162 TYPE I

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12031 ABORT: 3/3

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123R 179, 162 TYPE I

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE INHIBIT TO TURN ON RPC 14, 12. OTHER INHIBITS REQUIRED TO OPEN VALVE.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12032 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133R J8-Z, J8-M TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN THIS VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12033 ABORT: 3/1R

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133R J8-Z, J8-M TYPE III

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE (WITH BOTH SOLENOIDS ENERGIZED, VALVE WILL TRANSFER OR REMAIN OPEN). INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12034 ABORT: 2/2

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133R J2-L, J2-a TYPE IV

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION (LOSS OF MISSION). IF VALVE WAS OPEN, LOSE CAPABILITY TO CLOSE ISOLATION VALVE. INABILITY TO CLOSE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12035 ABORT: 3/3

ITEM: DRIVER, HYBRID  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DRIVER, HYBRID
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133R J2-L, J2-a TYPE IV

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE INHIBIT FROM THE SWITCH AND GPC INHIBITS FROM MDM FA4 TO TURN THE DRIVER ON. MANUAL AND GPC COMMANDS FOR VALVE MOVEMENT STILL OPERATE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12036 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J4-50, J4-47

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12037 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J4-50, J4-47

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY. GPC OPEN/CLOSE COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12038 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J6-54, J6-23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12039 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J6-54, J6-23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY. GPC OPEN/CLOSE COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12040 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123 J2-38, J2-19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CLOSE THE ISOLATION VALVE. ALSO LOSE INHIBIT TO OPEN THE ISOLATION VALVE. GPC COMMANDS FOR OPEN OR CLOSE OF VALVE STILL OPERABLE. LOSS OF ALL REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12041 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123 J2-38, J2-19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM MDM FA2, FA1 STIMULI. LOSE MANUAL CLOSE INHIBIT TO TYPE III "CLOSE" DRIVER.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12042 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123 J2-44, J2-28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC CAPABILITY TO CLOSE THE ISOLATION VALVE. MANUAL COMMAND FOR OPEN/CLOSE STILL OPERABLE FROM SWITCH. LOSS OF REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12043 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, LCA 3  
PART NUMBER: 56V76A123 J2-44, J2-28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM SWITCH STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12044 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-D, J2-T

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE WITH GPC. MANUAL OPEN/CLOSE COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12045 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-D, J2-T

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM SWITCH STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12046 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J5-j, J5-V

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY. GPC OPEN/CLOSE COMMAND TO MOVE VALVE STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12047 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J5-j, J5-V

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM MDM FA1, FA2. LOSE EXCLUSIVE GPC OPEN INHIBIT FROM MDM FA3.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/2R
MDAC ID:	12048	ABORT:	3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- MANIFOLD4) 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:            AV BAY 6, PCA 3  
PART NUMBER:    56V76A133 J5-j, J5-V

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE MANUALLY.    GPC  
OPEN/CLOSED COMMANDS TO MOVE VALVE STILL OPERABLE.    LOSS OF THIS  
REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES:    ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12049 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J5-j, J5-V

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM MDM FA3 STIMULI. LOSE EXCLUSIVE GPC OPEN INHIBIT FROM MDM FA1, FA2.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12050 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-F,J2-V

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC CAPABILITY TO OPEN ISOLATION VALVE MANUAL OPEN/CLOSE COMMANDS FROM SWITCH STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12051 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-F, J2-V

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM SWITCH STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12052 ABORT: 2/2

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J7-3, J7-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVES EITHER MANUALLY OR WITH GPC (LOSS OF MISSION).

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12053 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J7-3, J7-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FOR MDM OA1 AND FROM RPC 14, 12.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12054 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J6-42, J6-1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR OPEN VALVE STATUS VISUALLY. MANIFOLD STATUS MONITOR (MDM FA1, FA2) ALSO PROVIDES VALVE STATUS. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12055 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J6-42, J6-1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FOR DRIVER OUTPUT.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12056 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J6-33, J6-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR CLOSE VALVE STATUS VISUALLY. MANIFOLD STATUS MONITOR (MDM FA1, FA2) ALSO PROVIDES VALVE STATUS. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF VRCS (MISSION) IF VALVES THOUGHT TO BE CLOSED.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12057 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S26; S31  
PART NUMBER: 33V73A7 J6-33, J6-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FOR DRIVER OUTPUT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12058 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-6, J2-W

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE MANUALLY. GPC OPEN/CLOSED COMMANDS STILL OPERABLE. LOSS OF REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12059 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-6, J2-W

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM MDM FA3 STIMULI. LOSE MANUAL CONTROL INHIBIT.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12060 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-H, J7-X

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE WITH GPC. MANUAL OPEN/CLOSE COMMANDS FROM SWITCH STILL OPERABLE. LOSS OF REDUNDANCY TO CLOSE VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12061 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-H, J7-X

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM SWITCH.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12062 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-A, J2-P

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY INHIBIT THE DRIVER TO GROUND. GPC CAPABILITY TO INHIBIT GROUND DRIVER STILL OPERABLE. LOSS OF THIS REDUNDANCY TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12063 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-A, J2-P

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. PROVIDES ISOLATION FROM MDM FA4 STIMULI.

REFERENCES: ECN 102-8023A





INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12065 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-B, J2-R

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM SWITCH AND MDM FA4 "OPEN" STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12066 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-C, J2-S

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC OPEN INHIBIT TO THE GROUND DRIVER. MANUAL INHIBIT AND GPC CLOSE INHIBIT STILL OPERABLE. LOSS OF REDUNDANCY TO OPEN THE ISOLATION VALVE MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12067 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133 J2-C, J2-S

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM SWITCH AND MDM FA4 "CLOSE" STIMULI.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12068 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: MANIFOLD 5, OXIDIZER ISOLATION VALVE  
PART NUMBER: 51V42LV258 J15-1 (BOTH DIODES), 52V42LV358 J15-1  
(BOTH DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSS OF ONE DIODE HAS NO EFFECT. LOSS OF SECOND DIODE (THE REDUNDANCY) PREVENTS FURTHER OXIDIZER VALVE MOVEMENT. IF VALVE IS CLOSED, VRCS IS NOT OPERABLE (LOSS OF MISSION). IF VALVE IS OPEN, INABILITY TO CLOSE VALVES PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12069 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: MANIFOLD 5, OXIDIZER ISOLATION VALVE  
PART NUMBER: 51V42LV258 J15-1 (BOTH DIODES), 52V42LV358 J15-1  
(BOTH DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM ERRONEOUS STIMULI TO THE OXIDIZER SOLENOIDS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12070 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: MANIFOLD 5, FUEL ISOLATION VALVE  
PART NUMBER: 51V42LV257 J40-1 (BOTH DIODES); 5242LV357 J40-1  
(BOTH DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSS OF ONE DIODE HAS NO EFFECT. LOSS OF SECOND DIODE, (THE REDUNDANCY) PREVENTS FURTHER VALVE MOVEMENT. IF VALVE IS CLOSED, VRCS IS NOT OPERABLE (LOSS OF MISSION). IF VALVE IS OPEN, INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12071 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: MANIFOLD 5, FUEL ISOLATION VALVE  
PART NUMBER: 51V42LV257 J40-1 (BOTH DIODES); 5242LV357 J40-1  
(BOTH DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL  
SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. PROVIDES ISOLATION FROM ERRONEOUS STIMULI TO THE FUEL  
SOLENOIDS.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12072 ABORT: 2/2

ITEM: CIRCUIT BREAKER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) CIRCUIT BREAKER
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	2/2	AOA: 3/3
DEORBIT:	3/3	ATO: 2/2
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL R15  
PART NUMBER: 32V73A15 CB71, CB72

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO INHIBIT GROUND DRIVER MANUALLY. GPC COMMANDS STILL OPERABLE. LOSS OF THIS REDUNDANCY PREVENTS FURTHER VALVE MOVEMENT. IF VALVE IS CLOSED, VRCS IS NOT OPERABLE (LOSS OF MISSION). IF VALVE IS OPEN, INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH LOSS OF ALL HARDWARE REDUNDANCY, MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12073 ABORT: 3/3

ITEM: CIRCUIT BREAKER  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) CIRCUIT BREAKER
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL R15  
PART NUMBER: 32V73A15 CB71, CB72

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE CAPABILITY TO MANUALLY OPEN CIRCUIT BREAKER.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12074 ABORT: 3/2R

ITEM: SWITCH, SOLENOID TALKBACK  
FAILURE MODE: FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) SWITCH, SOLENOID TALKBACK
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: MANIFOLD 5, OX & FU ISOL VALVE  
PART NUMBER: 51V42LV258, 257 J15-3, 9; 5242LV358, 357 J15-3, 9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR ISOLATION VALVE OPEN OR CLOSE STATUS. MANIFOLD STATUS (MDM FA1, FA2) PROVIDES LATEST MICROSWITCH DISCRETE INFORMATION OF THE VALVES LOCATION. VRCS MAY BE LOST IF VALVES ARE THOUGHT TO BE CLOSED (LOSS OF MISSION). ALSO LOSE INHIBITS TO THE TYPE III "OPEN" AND "CLOSE" HYBRID DRIVERS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12075 ABORT: 3/2R

ITEM: SWITCH, SOLENOID TALKBACK  
FAILURE MODE: FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) SWITCH, SOLENOID TALKBACK
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: MANIFOLD 5, OX & FU ISOL VALVE  
PART NUMBER: 51V42LV258, 257 J15-3, 9; 5242LV358, 357 J15-3, 9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MONITOR VALVE OPEN OR CLOSE STATUS. VRCS MAY BE LOST IF VALVES ARE THOUGHT TO BE CLOSED (LOSS OF MISSION). ALSO LOSE INHIBITS TO THE TYPE III "OPEN" OR "CLOSE" HYBRID DRIVERS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12076 ABORT: 3/1R

ITEM: L/R HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV A OR B
- 5) L/R HE OX & FU ISOL VLV A OR B SWITCH 10, 11; 13, 14
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07  
PART NUMBER: 33V73A7S10, S11; 33V73A7S13, S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE ISOLATION VALVE. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF THE HELIUM SYSTEM LEADING TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROPELLANT TANKS AND LINES.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/1R  
MDAC ID: 12077 ABORT: 2/1R

ITEM: L/R HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV A OR B
- 5) L/R HE OX & FU ISOL VLV A OR B SWITCH 10, 11; 13, 14
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07  
PART NUMBER: 33V73A7S10, S11; 33V73A7S13, S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE CLOSED, A SHORT ACROSS CLOSE CONTACTS 5, 6 WILL PREVENT FURTHER VALVE MOVEMENT. LOSS OF HARDWARE REDUNDANCY PREVENTS RCS ACTIVITY WHICH MAY CAUSE INABILITY TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12079 ABORT: 3/1R

ITEM: L/R HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV A OR B
- 5) L/R HE OX & FU ISOL VLV A OR B SWITCH 10, 11; 13, 14
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07  
PART NUMBER: 33V73A7S10, S11; 33V73A7S13, S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

INADVERTENTLY LOSE CAPABILITY TO CLOSE ISOLATION VALVE. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, PREVENTS ISOLATION OF THE HELIUM SYSTEM LEADING TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROPELLANT TANKS AND LINES.

REFERENCES: ECN 102-8023A



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/1R  
12080 MDAC ID: ABORT: 2/1R

ITEM: L/R HE OX & FU ISOL VLV A OR B SWITCH  
FAILURE MODE: SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV A OR B
- 5) L/R HE OX & FU ISOL VLV A OR B SWITCH 10, 11; 13, 14
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07  
PART NUMBER: 33V73A7S10, S11; 33V73A7S13, S14

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH THE VALVE CLOSED, POLE TO POLE SHORT WHICH SHORTS ACROSS CONTACTS 5, 6 WILL PREVENT FURTHER VALVE MOVEMENT. LOSS OF HARDWARE REDUNDANCY PREVENTS RCS ACTIVITY WHICH MAY CAUSE INABILITY TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12081 ABORT: 3/1R

ITEM: L/R OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) L/R OX & FU TK ISOL VLV 1/2 SWITCH 16, 19
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S16; PNL 07 S19  
PART NUMBER: 33V73A7S16; S19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CONTROL THE VALVE WITH THE SWITCH. REDUNDANCY IS PROVIDED BY THE GPC. LOSS OF THIS REDUNDANCY PREVENTS OPENING/CLOSING THE ISOLATION VALVE. FAILURE TO OPEN THE ISOLATION VALVE AND THE LOSS OF REDUNDANCY PREVENTS AFT RCS ACTIVITY WHICH MAY LEAD TO EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS OR C.G. SAFETY MARGINS. FAILURE TO CLOSE THE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, DC, CC

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12082 ABORT: 1/1

ITEM: L/R OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) L/R OX & FU TK ISOL VLV 1/2 SWITCH 16, 19
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S16; PNL 07 S19  
PART NUMBER: 33V73A7S16; S19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ACROSS OPEN CONTACTS CAUSES INABILITY TO CLOSE THE VALVE. THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION OPERATIONS. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12, DC, CC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12083 ABORT: 1/1

ITEM: L/R OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) L/R OX & FU TK ISOL VLV 1/2 SWITCH 16, 19
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S16; PNL 07 S19  
PART NUMBER: 33V73A7S16; S19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ACROSS OPEN CONTACTS CAUSES INABILITY TO CLOSE THE VALVE. THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION OPERATIONS. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12, DC, CC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12084 ABORT: 1/1

ITEM: L/R OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) L/R OX & FU TK ISOL VLV 1/2 SWITCH 16, 19
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S16; PNL 07 S19  
PART NUMBER: 33V73A7S16; S19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH INADVERTENTLY OPERATING CAUSES INABILITY TO CLOSE THE VALVE. THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12, DC, CC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12085 ABORT: 3/1R

ITEM: L/R OX & FU TK ISOL VLV 1/2 SWITCH  
FAILURE MODE: SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) L/R OX & FU TK ISOL VLV 1/2 SWITCH 16, 19
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S16; PNL 07 S19  
PART NUMBER: 33V73A7S16; S19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH A SHORT TO CASE, CAPABILITY TO MANUALLY SWITCH THE VALVES IS LOST (BLOWN FUSE). REDUNDANCY IS PROVIDED WITH GPC COMMANDS. LOSS OF ALL REDUNDANCY PREVENTS CLOSING THE VALVE TO ISOLATE A THRUSTER LEAK WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, DC, CC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12086 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-73, J2-39, J2-63, J2-49; J5-25, J5-9,  
J5-27, J5-15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKBACK LOGIC TO TURN MOTOR OFF. MOTOR CAN WITHSTAND  
CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12087 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-73, J2-39, J2-63, J2-49; J5-25, J5-9,  
J5-27, J5-15

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12088 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSED CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-74, J2-50; J5-26, J5-8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKBACK LOGIC TO TURN MOTOR OFF. MOTOR CAN WITHSTAND  
CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12089 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSED CIRCUIT)  
FAILUREMODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-74, J2-50; J5-26, J5-8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12090 ABORT: 1/1

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J3-108, J2-16, J3-107; J3-38, J5-121, J3-59

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO CLOSE THE VALVE. MANUAL COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12091 ABORT: 3/3

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J3-108, J2-16, J3-107; J3-38, J5-121, J3-59

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12092 ABORT: 3/1R

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J3-101, J2-26, J3-100; J3-128, J5-119,  
J3-39

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO OPEN THE VALVE. MANUAL COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET TANK LANDING CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12093 ABORT: 3/3

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J3-101, J2-26, J3-100; J3-128, J5-119,  
J3-39

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12094 ABORT: 3/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-60, J3-110; J5-49, J3-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO OPEN THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET TANK LANDING CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12095 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-60, J3-110; J5-49, J3-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12096 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-48, J3-111; J5-19, J3-1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO CLOSE THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12097 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-48, J3-111; J5-19, J3-1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12098 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-60, J3-110; J5-49, J3-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE CLOSE RELAYS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12099 ABORT: 1/1

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	2/2
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J2-60, J3-110; J5-49, J3-7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE VALVE (OPEN RELAY HAS CONSTANT INHIBIT). THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12100 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J3-111, J2-48; J3-1, J5-19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE "POWER OFF" INHIBIT TO OPEN THE RELAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12101 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 1/2
- 5) DIOE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 J3-111, J2-48; J3-1, J5-19

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12102 ABORT: 3/1R

ITEM: L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH 17, 18; 20, 21
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S17, S18; PNL 07 S20, S21  
PART NUMBER: 33V73A7S17, S18; 33V73A7S20; S21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CONTROL THE VALVE WITH THE SWITCH. REDUNDANCY IS PROVIDED BY THE GPC. LOSS OF THIS REDUNDANCY PREVENTS OPENING/CLOSING THE ISOLATION VALVE. FAILURE TO RE-OPEN THE ISOLATION VALVE AND THE LOSS OF REDUNDANCY PREVENTS AFT RCS ACTIVITY WHICH MAY LEAD TO EXCEEDNCE OF LANDING WEIGHT CONSTRAINTS. FAILURE TO CLOSE THE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, DB, CB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12103 ABORT: 1/1

ITEM: L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH  
FAILURE MODE: SWITCH FAILS WORST (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH 17, 18; 20, 21
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S17, S18; PNL 07 S20, S21  
PART NUMBER: 33V73A7S17, S18; 33V73A7S20; S21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ACROSS OPEN CONTACTS CAUSES INABILITY TO CLOSE THE VALVE. THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12, DB, CB



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12104 ABORT: 1/1

ITEM: L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH 17, 18; 20, 21
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S17, S18; PNL 07 S20, S21  
PART NUMBER: 33V73A7S17, S18; 33V73A7S20; S21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ACROSS OPEN CONTACTS CAUSES INABILITY TO CLOSE THE VALVE. THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12, DB, CB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12105 ABORT: 1/1

ITEM: L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH 17, 18; 20, 21
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S17, S18; PNL 07 S20, S21  
PART NUMBER: 33V73A7S17, S18; 33V73A7S20; S21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH INADVERTENTLY OPERATING ACROSS OPEN CONTACTS CAUSES INABILITY TO CLOSE THE VALVE. THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12, DB, CB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12106 ABORT: 3/1R

ITEM: L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH  
FAILURE MODE: SHORT TO CASE OF POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) L/R OX & FU TK ISOL VLV 3/4/5 A OR B SWITCH 17, 18; 20, 21
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S17, S18; PNL 07 S20, S21  
PART NUMBER: 33V73A7S17, S18; 33V73A7S20; S21

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

WITH A SHORT TO CASE, CAPABILITY TO MANUALLY SWITCH THE VALVE IS LOST (BLOWN FUSE). REDUNDANCY IS PROVIDED WITH GPC COMMANDS. LOSS OF ALL REDUNDANCY PREVENTS CLOSING THE VALVE TO ISOLATE A THRUSTER LEAK WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, DB, CB

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12107 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-48, J2-69 - J2-87, J2-74; J2-36, J2-17 - J1-50, J1-60

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKBACK LOGIC TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12108 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-48, J2-69 - J2-87, J2-74; J2-36, J2-17 - J1-50,  
J1-60

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL  
SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE  
SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12109 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: 33V73A7A2CR28, A1CR35; J2-34, J1-17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKABACK LOGIC TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12110 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: 33V73A7A2CR28, A1CR35; J2-34, J1-17

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12111 ABORT: 1/1

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-89, J2-87 - J2-78, J2-77; J2-56, J2-16 - J1-39,  
J1-37

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL  
SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO CLOSE THE VALVE. MANUAL COMMANDING STILL  
AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO  
ISOLATE A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE  
SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12112 ABORT: 3/3

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-89, J2-87 - J2-78, J2-77; J2-56, J2-16 - J1-39,  
J1-37

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL  
SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE  
SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12113 ABORT: 3/1R

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-90, J2-88 - J2-80, J2-79; J2-67, J2-25 - J1-41, J1-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO OPEN THE VALVE. MANUAL COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET TANK LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12114 ABORT: 3/3

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-90, J2-88 - J2-80, J2-79; J2-67, J2-25 - J1-41,  
J1-40

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL  
SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE  
SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12115 ABORT: 3/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-23, J2-106; J2-7, J1-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO OPEN THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET TANK LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12116 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-23, J2-106; J2-7, J1-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12117 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-21, J2-96; J2-15, J1-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO CLOSE THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12118 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-21, J2-96; J2-15, J1-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12119 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-23, J2-106; J2-7, J1-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE CLOSE RELAYS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	2/2
MDAC ID:	12120	ABORT:	1/1

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

**BREAKDOWN HIERARCHY:**

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	2/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                      AFT MCA 1  
PART NUMBER:    J2-23, J2-106; J2-7, J1-30

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE CAPABILITY TO CLOSE THE VALVE (OPEN RELAY HAS CONSTANT INHIBIT). THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12121 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-21, J2-106; J2-15, J1-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE "POWER OFF" INHIBIT TO OPEN THE RELAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12122 ABORT: 2/1R

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT MCA 1  
PART NUMBER: J2-21, J2-106; J2-15, J1-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE WAS OPENED WITH THE GPC, LOSE INHIBIT TO CLOSE THE VALVE. OTHER LEG AVAILABLE. LOSS OF ALL REDUNDANCY PREVENTS AFT RCS ACTIVITY WHICH MAY LEAD TO EXCEEDANCE OF LANDING CONSTRAINTS AND/OR C.G. SAFETY MARGINS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12123 ABORT: 3/2R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 DS1; DS4  
PART NUMBER: 33V73A7A2CR5, A2CR6; 33V73A7A3CR5, A3CR6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

REDUNDANCY IS PROVIDED WITH THE GPCs. LOSS OF THIS REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED WHICH COULD PREVENT SOME MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12124

HIGHEST CRITICALITY      HDW/FUNC  
FLIGHT: 3/3  
ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU TK ISOL VLV 3/4/5 A OR B
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]      B [    ]      C [    ]

LOCATION:            PNL 07 DS1; DS4  
PART NUMBER:    33V73A7A2CR5, A2CR6; 33V73A7A3CR5, A3CR6

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.    TALKBACK IS STILL AVAILABLE.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12125 ABORT: 2/1R

ITEM: L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 07 S32; PNL 07 S34  
PART NUMBER: 33V73A7S32; S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUAL SWITCH THE VALVES OPEN OR CLOSE.  
REDUNDANCY TO OPEN OR CLOSE THE VALVE IS PROVIDED WITH THE GPCs.  
LOSS OF ALL REDUNDANCY MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12126 ABORT: 1/1

ITEM: L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S32; PNL 07 S34  
PART NUMBER: 33V73A7S32; S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUAL SWITCH THE VALVES OPEN OR CLOSE ONCE IT SHORTS. NO REDUNDANCY IS AVAILABLE. INABILITY TO SWITCH THE VALVE CLOSED MAY EFFECT MISSION OBJECTIVES. INABILITY TO SWITCH VALVE OPEN DURING RTLS/TAL PREVENTS PROPELLANTS TO BE EXPELLED.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12127 ABORT: 1/1

ITEM: L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34  
FAILURE MODE: SWITCH SHORTS ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S32; PNL 07 S34  
PART NUMBER: 33V73A7S32; S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

A SHORT ACROSS EITHER CLOSE CONTACT SET (11, 12 OR 5, 6) WILL PREVENT THE VALVE FROM BEING OPENED. INABILITY TO OPEN THE CROSSFEED VALVE MAY EFFECT MISSION OBJECTIVES. INABILITY TO OPEN VALVE DURING RTLS/TAL PREVENTS PROPELLANTS TO BE EXPELLED.

REFERENCES: VS70-943099 REV B EO B12, DD, CD



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12128 ABORT: 3/1R

ITEM: L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34  
FAILURE MODE: SWITCH INADVERTENTLY FAILS OPEN/SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S32; PNL 07 S34  
PART NUMBER: 33V73A7S32; S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF VALVE IS CLOSED TO ISOLATE A THRUSTER LEAK, INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS LEAK.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12129 ABORT: 2/1R

ITEM: L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S32; PNL 07 S34  
PART NUMBER: 33V73A7S32; S34

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

A SHORT TO CASE WILL BLOW THE 1 AMP FUSE THUS PREVENTING MANUAL SWITCHING OF VALVES. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12130 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J2-86, J2-66, J2-53, J2-76; J5-42, J5-79, J5-89, J5-76

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE LOGIC TALKBACK TO TURN OFF MOTOR WHEN MOTOR WAS TURNED ON MANUALLY TO OPEN THE VALVE. MOTOR CAN WITHSTAND CONTINUOUS POWER. MOTOR TURNS OFF WHEN VALVE IS COMMANDED CLOSED. THUS, NO EFFECT TO OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12131 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J2-86, J2-66, J2-53, J2-76; J5-42, J5-79, J5-89, J5-76

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12132 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSED CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J2-87, J2-77; J5-43, J5-77

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE LOGIC TALKBACK TO UNLATCH THE RELAY WHEN MOTOR WAS TURNED ON MANUALLY TO CLOSE THE VALVE. REDUNDANCY TO TURN MOTOR OFF IS PROVIDED WITH ANOTHER DIODE TO UNLATCH THE RELAY. LOSS OF ALL REDUNDANCY CAUSES INABILITY TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. THUS, NO EFFECT TO OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12133 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSED CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J2-87, J2-77; J5-43, J5-77

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

ALLOWS ONE CONTACT SET ON THE SWITCH TO DISCONTINUE POWER TO BOTH  
"CLOSE" RELAYS. NO EFFECT ON OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12134 ABORT: 3/1R

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-117, J2-30, J3-116; J3-52, J5-40,  
J3-53

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE VALVES WITH THE GPC. MANUAL SWITCH  
COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO CLOSE THE  
VALVE MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12135 ABORT: 3/3

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-117, J2-30, J3-116; J3-52, J5-40,  
J3-53

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2  
MDAC ID: 12136 ABORT: 1/1

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-113, J2-44, J3-119; J3-62, J5-32,  
J3-50

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN THE VALVE WITH THE GPC. MANUAL SWITCH  
COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO OPEN THE  
VALVE EFFECTS MISSION OBJECTIVES. INABILITY TO OPEN THE VALVE  
DURING RTLS/TAL MAY CAUSE INABILITY TO COMPLETE AN OMS ABORT  
DUMP.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12137 ABORT: 3/3

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-113, J2-44, J3-119; J3-62, J5-32,  
J3-50

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/2R
MDAC ID:	12138	ABORT:	2/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]            B [ P ]            C [ P ]

LOCATION:            AV BAY 6, MCA 3  
PART NUMBER:    56V76A116 - J3-3, J3-43; J3-66, J3-30

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE CAPABILITY TO MANUALLY OPEN THE VALVE.    GPC COMMANDING TO OPEN THE VALVE STILL AVAILABLE.    LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY EFFECT MISSION OBJECTIVES.

REFERENCES:    VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12139

HIGHEST CRITICALITY  
FLIGHT: 3/3  
ABORT: 3/3

HDW/FUNC  
3/3  
3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN  
SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-3, J3-43; J3-66, J3-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT ON OPERATIONS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12140 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX& FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-4, J2-29; J3-67, J5-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CLOSE THE VALVE. GPC COMMANDING TO CLOSE THE VALE STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO CLOSE THE VALVE MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12141 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-4, J2-29; J3-67, J5-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT ON OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12142 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-3, J2-43; J3-66, J5-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE INHIBIT TO ENSURE "CLOSE" RELAYS UNLATCH WHILE ATTEMPTING TO OPEN THE VALVE MANUALLY. NO EFFECT ON OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12143 ABORT: 3/1R

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-3, J2-43; J3-66, J5-30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE IS ATTEMPTED TO BE CLOSED USING THE GPC, THE VALVE WILL CLOSE TEMPORARILY. HOWEVER, WITH THE SHORTED DIODE, "OPEN" RELAYS ARE ENABLED TO CONDUCT THUS OPENING THE VALVES. SWITCH OPERATION PREVENTS THIS FROM OCCURRING. LOSS OF ALL REDUNDANCY MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12144 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-4, J2-20; J3-67, J5-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE INHIBIT TO ENSURE "OPEN" RELAYS UNLATCH WHILE ATTEMPTING TO  
CLOSE THE VALVE MANUALLY. NO EFFECT ON OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12145 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, MCA 3  
PART NUMBER: 56V76A116 - J3-4, J2-20; J3-67, J5-29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. ONE OF TWO CLOSED RELAYS IN SERIES INHIBITED IS WORST EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12146 ABORT: 2/1R

ITEM: L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PNL 07 S33; PNL 07 S35  
PART NUMBER: 33V73A7S33; S35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY SWITCH THE VALVE OPEN OR CLOSE.  
REDUNDANCY TO OPEN OR CLOSE THE VALVE IS PROVIDED WITH THE GPC.  
LOSS OF ALL REDUNDANCY MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12147 ABORT: 1/1

ITEM: L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 07 S33; PNL 07 S35  
PART NUMBER: 33V73A7S33; S35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY SWITCH THE VALVE ONCE IT SHORTS. NO REDUNDANCY IS AVAILABLE. INABILITY TO SWITCH THE VALVE CLOSED MAY EFFECT MISSION OBJECTIVES. INABILITY TO SWITCH VALVE OPEN DURING RTLS/TAL PREVENTS PROPELLANT TO BE EXPELLED.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	2/2
MDAC ID:	12148	ABORT:	1/1

ITEM: L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35  
FAILURE MODE: SWITCH ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL 07 S33; PNL 07 S35  
PART NUMBER:    33V73A7S33; S35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

A SHORT ACROSS EITHER CLOSE CONTACT SET (11, 12 OR 5, 6) WILL PREVENT THE VALVE FROM BEING OPENED. INABILITY TO OPEN THE CROSSFEED VALVE MAY EFFECT MISSION OBJECTIVES. INABILITY TO OPEN VALVE DURING RTLS/TAL PREVENTS PROPELLANTS TO BE EXPELLED.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12149 ABORT: 3/1R

ITEM: L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35  
FAILURE MODE: SWITCH INADVERTENTLY FAILS OPEN/CLOSED

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: PNL 07 S33; PNL 07 S35  
PART NUMBER: 33V73A7S33; S35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF VALVE IS CLOSED TO ISOLATE A THRUSTER LEAK, INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, DD, CD



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12151

HIGHEST CRITICALITY  
FLIGHT: 3/3  
ABORT: 3/3

HDW/FUNC  
3/3  
3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN  
SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J3-46, J3-8, J3-35, J4-7; J2-64, J2-80, J2-73, J2-62

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE LOGIC TALKBACK TO TURN MOTOR OFF WHEN MOTOR WAS TURNED ON MANUALLY TO OPEN THE VALVE. MOTOR CAN WITHSTAND CONTINUOUS POWER. MOTOR TURNS OFF WHEN VALVE IS COMMANDED CLOSED. THUS, NO EFFECT TO OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12152 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J3-46, J3-8, J3-35, J4-7; J2-64, J2-80,  
J2-73, J2-62

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12153 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSED CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J3-86, J4-9; J2-65, J2-63

VIBRATION CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE LOGIC TALKBACK TO UNLATCH THE RELAY WHEN MOTOR WAS TURNED ON MANUALLY TO CLOSE THE VALVE. REDUNDANCY TO TURN MOTOR OFF IS PROVIDED. LOSS OF ALL REDUNDANCY CAUSES INABILITY TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. THUS, NO EFFECT TO OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12155 ABORT: 3/1R

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-5, J1-56, J6-7; J3-80, J2-84, J3-81

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE VALVES WITH THE GPC. MANUAL SWITCH COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO CLOSE THE VALVE MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12156 ABORT: 3/3

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-5, J1-56, J6-7; J3-80, J2-84, J3-81

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12157 ABORT: 1/1

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-8, J1-7, J6-49; J3-82, J2-83, J3-83

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN THE VALVE WITH THE GPC. MANUAL SWITCH COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE EFFECTS MISSION OBJECTIVES. INABILITY TO OPEN THE VALVE WITH THE GPC DURING RTLS/TAL ABORT MAY CAUSE INABILITY TO COMPLETE OMS ABORT DUMP.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12158 ABORT: 3/3

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-8, J1-7, J6-49; J3-82, J2-83, J3-83

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12159 ABORT: 2/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-48; J6-57; J3-91, J2-46

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN THE VALVE. GPC COMMANDING TO OPEN THE VALVE STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY EFFECT MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12160 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-48; J6-57; J3-91, J2-46

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT ON OPERATIONS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12161 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-6, J3-16; J3-90, J2-68

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY CLOSE THE VALVE. GPC COMMANDING TO CLOSE THE VALVE STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO CLOSE THE VALVE MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12162 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A14 - J6-6, J3-16; J3-90, J2-68

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT ON OPERATIONS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12163 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-48, J6-57; J3-91, J2-46

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE INHIBIT TO ENSURE "CLOSE" RELAYS UNLATCH WHILE ATTEMPTING TO OPEN THE VALVE MANUALLY. NO EFFECT ON OPERATIONS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12164 ABORT: 3/1R

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-48, J6-57; J3-91, J2-46

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE IS ATTEMPTED TO BE CLOSED USING THE GPC, THE VALVE WILL CLOSE TEMPORARILY. HOWEVER, WITH THE SHORTED DIODE, OPEN RELAYS ARE ENABLED TO CONDUCT THUS OPENING THE VALVES. SWITCH OPERATIONS PREVENTS THIS FROM OCCURRING. LOSS OF ALL REDUNDANCY MAY PREVENT ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12165 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	HDW/FUNC
PRELAUNCH:	3/3	ABORT	
LIFTOFF:	3/3	RTLS:	3/3
ONORBIT:	3/3	TAL:	3/3
DEORBIT:	3/3	AOA:	3/3
LANDING/SAFING:	3/3	ATO:	3/3

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-6, J3-16; J3-90, J2-68

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE INHIBIT TO ENSURE "OPEN" RELAYS UNLATCH WHILE ATTEMPTING TO CLOSE THE VALVE MANUALLY. NO EFFECT ON OPERATION.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12166 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3  
PART NUMBER: 54V76A114 - J6-6, J3-16; J3-90, J2-68

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. ONE OF TWO CLOSE RELAYS IN SERIES INHIBITED IS WORST EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12167 ABORT: 1/1

ITEM: MASTER RCS CROSSFEED SWITCH 36  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2 & 3/4/5
- 5) MASTER RCS CROSSFEED SWITCH 36
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S36  
PART NUMBER: 33V73A7S36

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO FEED FROM LEFT OR RIGHT WITH GPC COMMANDS. MANUAL CONFIGURATION OF VALVES PROVIDES REDUNDANCY (AND OVERRIDES GPC COMMANDS). LOSS OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CROSSFEED AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS AND/OR C.G. SAFETY BOUNDARIES FOR RTLS/TAL ABORTS.

REFERENCES: VS70-943099 REV B EO B12, CD

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12168 ABORT: 1/1

ITEM: MASTER RCS CROSSFEED SWITCH 36  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2 & 3/4/5
- 5) MASTER RCS CROSSFEED SWITCH 36
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S36  
PART NUMBER: 33V73A7S36

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILURE CAUSES CROSSFEEDING OPERATION FRO ONLY THE LEFT OR ONLY THE RIGHT. MANUAL CONFIGURATION OF VALVES PROVIDES REDUNDANCY (AND OVERRIDES GPC COMMANDS). LOSS OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CROSSFEED AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS AND/OR C.G. SAFETY BOUNDARIES FOR RTLS/TAL ABORTS.

REFERENCES: VS70-943099 REV B EO B12, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12169 ABORT: 1/1

ITEM: MASTER RCS CROSSFEED SWITCH 36  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2 & 3/4/5
- 5) MASTER RCS CROSSFEED SWITCH 36
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S36  
PART NUMBER: 33V73A7S36

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH FAILS SHORT ACROSS "OFF" CONTACTS (CONTACTS NOT IN A CIRCUIT) LOSE CAPABILITY TO PERFORM CROSSFEEDING OPERATIONS WITH THE GPC. THIS IS THE WORST CASE SINCE IT CAUSES INCREASED NUMBER OF MANUAL SWITCH MOVEMENTS TO CONFIGURE THE VALVES FOR CROSSFEEDING. LOSS OF THIS REDUNDANCY WILL CAUSE THE INABILITY TO CROSSFEED AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS AND/OR C.G. SAFETY BOUNDARIES FOR RTLS/TAL ABORTS.

REFERENCES: VS70-943099 REV B EO B12, CD

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12170 ABORT: 1/1

ITEM: MASTER RCS CROSSFEED SWITCH 36  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2 & 3/4/5
- 5) MASTER RCS CROSSFEED SWITCH 36
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S36  
PART NUMBER: 33V73A7S36

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. SWITCH EASILY RETURNED TO PREVIOUS POSITION TO OFFSET THE PROBLEM.

REFERENCES: VS70-943099 REV B EO B12, CD

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12171 ABORT: 1/1

ITEM: MASTER RCS CROSSFEED SWITCH 36  
FAILURE MODE: SWITCH SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) L/R OX & FU CROSSFEED VLV 1/2 & 3/4/5
- 5) MASTER RCS CROSSFEED SWITCH 36
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	1/1
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S36  
PART NUMBER: 33V73A7S36

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE MAY BLOW ONE, TWO OR ALL THESE 1 AMP FUSES SUPPORTING THE CIRCUIT. WORST CASE (2 OR MORE BLOWN), LOSE CAPABILITY TO AUTO CROSSFEED WITH THE GPC. MANUAL SWITCH CONFIGURATION PROVIDES REDUNDANCY. LOSS OF THIS WILL CAUSE THE INABILITY TO CROSSFEED AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET THE TANK LANDING WIEGHT CONSTRAINTS OR C.G. SAFETY MARGINS FOR RTLS/TAL ABORTS.

REFERENCES: VS70-943099 REV B EO B12, CD



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12173 ABORT: 1/1

ITEM: MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S22, S27  
PART NUMBER: 33V73A7S22, S27

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CLOSE CONTACTS, CAPABILITY TO OPEN THE VALVE IS LOST. REDUNDANCY PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS SINCE PROPELLANT CANNOT BE RELEASED. THIS MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12174 ABORT: 1/1

ITEM: MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27  
FAILURE MODE: SWITCH SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S22, S27  
PART NUMBER: 33V73A7S22, S27

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. REDUNDANCY PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS SINCE PROPELLANT CANNOT BE EXPELLED. THIS MAY RESULT MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12175 ABORT: 3/1R

ITEM: MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S22, S27  
PART NUMBER: 33V73A7S22, S27

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF VALVE WAS CLOSED IN ORDER TO ISOLATE A THRUSTER LEAK.  
INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS  
THRUSTER LEAK CAUSING LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12176 ABORT: 2/1R

ITEM: MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S22, S27  
PART NUMBER: 33V73A7S22, S27

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW CAUSING THE INABILITY TO OPEN/CLOSE THE VALVE MANUALLY. GPC COMMANDING OF THE VALVE STILL AVAILABLE. LOSS OF THIS REDUNDANCY PREVENTS FURTHER VALVE MOVEMENT THUS POSSIBLE EXCEEDANCE OF LANDING WEIGHT WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12177 ABORT: 2/1R

ITEM: MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28  
FAILURE MODE: FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S23, S28  
PART NUMBER: 33V73A7S23, S28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO MANUALLY OPEN (CLOSE) THE VALVE. GPC COMMANDS PROVIDE REDUNDANCY TO OPEN (CLOSE) THE VALVE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS. INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. BOTH WARRANT LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12178 ABORT: 1/1

ITEM: MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S23, S28  
PART NUMBER: 33V73A7S23, S28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CLOSE CONTACTS, CAPABILITY TO OPEN THE VALVE IS LOST. REDUNDANCY PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS SINCE PROPELLANT CANNOT BE RELEASED. THIS MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
 SUBSYSTEM: ARCS  
 MDAC ID: 12179

HIGHEST CRITICALITY HDW/FUNC  
 FLIGHT: 3/1R  
 ABORT: 1/1

ITEM: MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28  
 FAILURE MODE: SWITCH SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 07 S23, S28  
 PART NUMBER:                33V73A7S23, S28

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. REDUNDANCY PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS SINCE PROPELLANT CANNOT BE EXPELLED. THIS MAY RESULT MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES:    VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12180 ABORT: 3/1R

ITEM: MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S23, S28  
PART NUMBER: 33V73A7S23, S28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF VALVE WAS CLOSED IN ORDER TO ISOLATE A THRUSTER LEAK.  
INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS  
THRUSTER LEAK CAUSING LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12181 ABORT: 2/1R

ITEM: MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 2, L/R OX & FU ISOL VLV SWITCHES 23, 28
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S23, S28  
PART NUMBER: 33V73A7S23, S28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW CAUSING THE INABILITY TO OPEN/CLOSE THE VALVE MANUALLY. GPC COMMANDING OF THE VALVE STILL AVAILABLE. LOSS OF THIS REDUNDANCY PREVENTS FURTHER VALVE MOVEMENT THUS POSSIBLE EXCEEDANCE OF LANDING WEIGHT WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE







INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12184 ABORT: 3/1R

ITEM: MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29  
FAILURE MODE: SWITCH SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S24, S29  
PART NUMBER: 33V73A7S24, S29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. REDUNDANCY PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS SINCE PROPELLANT CANNOT BE EXPELLED. THIS MAY RESULT MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12185 ABORT: 3/1R

ITEM: MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLV
- 5) MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S24, S29  
PART NUMBER: 33V73A7S24, S29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF VALVE WAS CLOSED IN ORDER TO ISOLATE A THRUSTER LEAK.  
INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS  
THRUSTER LEAK CAUSING LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12186 ABORT: 2/1R

ITEM: MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S24, S29  
PART NUMBER: 33V73A7S24, S29

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW CAUSING THE INABILITY TO OPEN/CLOSE THE VALVE MANUALLY. GPC COMMANDING OF THE VALVE STILL AVAILABLE. LOSS OF THIS REDUNDANCY PREVENTS FURTHER VALVE MOVEMENT THUS POSSIBLE EXCEEDANCE OF LANDING WEIGHT WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12187 ABORT: 2/1R

ITEM: MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30  
FAILURE MODE: FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S25, S30  
PART NUMBER: 33V73A7S25, S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILILTY TO MANUALLY OPEN (CLOSE) THE VALVE. GPC COMMANDS PROVIDE REDUNDANCY TO OPEN (CLOSE) THE VALVE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS. INABILITY TO CLOSE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. BOTH WARRANT LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12188 ABORT: 1/1

ITEM: MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S25, S30  
PART NUMBER: 33V73A7S25, S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CLOSE CONTACTS, CAPABILITY TO OPEN THE VALVE IS LOST. REDUNDANCY PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS SINCE PROPELLANT CANNOT BE RELEASED. THIS MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12189 ABORT: 1/1

ITEM: MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30  
FAILURE MODE: SWITCH SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVs
- 5) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S25, S30  
PART NUMBER: 33V73A7S25, S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS ACROSS CONTACT SET 5, 6 (CLOSE), CAPABILITY TO OPEN THE VALVE IS LOST. REDUNDANCY PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE EXCEEDANCE OF LANDING WEIGHT CONSTRAINTS SINCE PROPELLANT CANNOT BE EXPELLED. THIS MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/1R
MDAC ID:	12190	ABORT:	3/1R

ITEM: MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                PNL 07 S25, S30  
PART NUMBER:        33V73A7S25, S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF VALVE WAS CLOSED IN ORDER TO ISOLATE A THRUSTER LEAK. INADVERTENTLY OPENING THE VALVE PREVENTS ISOLATION OF THIS THRUSTER LEAK CAUSING LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12191 ABORT: 2/1R

ITEM: MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 07 S25, S30  
PART NUMBER: 33V73A7S25, S30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE 1 AMP FUSE WILL BLOW CAUSING THE INABILITY TO OPEN/CLOSE THE VALVE MANUALLY. GPC COMMANDING OF THE VALVE STILL AVAILABLE. LOSS OF THIS REDUNDANCY PREVENTS FURTHER VALVE MOVEMENT THUS POSSIBLE EXCEEDANCE OF LANDING WEIGHT WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/3
MDAC ID:	12192	ABORT:	3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:            AFT MCA #2  
PART NUMBER:    J1-57, 67; J1-54, 63

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE LOGIC TALKBACK TO TURN MOTOR OFF.    MOTOR CAN WITHSTAND CONTINUOUS POWER.    VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/3
MDAC ID:	12194	ABORT:	3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                      AFT MCA #2  
PART NUMBER:    J1-56, 66; J1-53, 64

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE TALKBACK LOGIC TO TURN MOTOR OFF.    MOTOR CAN WITHSTAND CONTINUOUS POWER.    VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12195 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-56, 66; J1-53, 64

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE ISOLATION BETWEEN MANUAL OPEN AND SWITCH TALKBACK DISPLAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12196 ABORT: 3/1R

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #2  
PART NUMBER: J3-33, J1-33; J3-87, J1-87

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO CLOSE THE VALVE. MANUAL COMMANDING AND SECOND GPC COMMAND STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY ISOLATE A LEAK, WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12197 ABORT: 3/3

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #2  
PART NUMBER: J3-33, J1-33; J3-87, J1-87

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12198 ABORT: 2/1R

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-23; J1-20

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO OPEN THE VALVE. MANUAL COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12199 ABORT: 2/1R

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-23; J1-20

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12231 ABORT: 3/3

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-21; CR32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12200 ABORT: 2/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-43; J1-86

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO OPEN THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12201 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-43; J1-86

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12202 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-34; J1-85

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO CLOSE THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12203 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-34; J1-85

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12204 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-43; J1-86

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE CLOSE RELAYS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12205 ABORT: 3/1R

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-43; J1-86

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE VALVE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12206 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-34; J1-85

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE OPEN RELAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12207 ABORT: 2/1R

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 1, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT MCA #2  
PART NUMBER: J1-34; J1-85

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE WAS OPENED WITH THE GPC, LOSE CAPABILITY TO RE-OPEN THE VALVE. MANUAL SWITCH REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS AND/OR C.G. SAFETY MARGINS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12208 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-40, 28; J2-42, 31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE LOGIC TALKBACK TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS&a1152HHANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12209 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-40, 28; J2-42, 31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE ISOLATION BETWEEN MANUAL CLOSE AND SWITCH TALKBACK DISPLAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12210 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] 3096HB [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-41, 29; J2-43, 32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKBACK LOGIC TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12211 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-41, 29; J2-43, 32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE ISOLATION BETWEEN MANUAL OPEN AND SWITCH TALKBACK DISPLAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12212 ABORT: 3/1R

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AFT MCA #1  
PART NUMBER: J3-17, J2-55; J2-99, J3-2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO CLOSE THE VALVE. MANUAL COMMANDING AND SECOND GPC COMMAND STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY ISOLATE A LEAK, WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12214 ABORT: 2/1R

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-5, J2-58

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO OPEN THE VALVE. MANUAL COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12215

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: 3/3

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                AFT MCA #1  
PART NUMBER:        J2-5; J2-58

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL  
SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE  
SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12216

HIGHEST CRITICALITY  
FLIGHT: 3/1R  
ABORT: 2/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN  
SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-12; J2-57

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO OPEN THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12217 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-12; J2-57

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12218 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-11; J2-47

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO CLOSE THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12219 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-11; J2-47

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12220 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-12; J2-57

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE CLOSE RELAYS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12221

HIGHEST CRITICALITY  
FLIGHT: 3/1R  
ABORT: 3/1R  
HDW/FUNC

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ F ]                      C [ P ]

LOCATION:            AFT MCA #1  
PART NUMBER:    J2-12; J2-57

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE CAPABILITY TO CLOSE THE VALVE.    LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12222 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-11; J2-47

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE OPEN RELAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12223 ABORT: 2/1R

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 2, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT MCA #1  
PART NUMBER: J2-11; J2-47

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE WAS OPENED WITH THE GPC, LOSE CAPABILITY TO RE-OPEN THE VALVE. MANUAL SWITCH PROVIDES REDUNDANCY. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS AND/OR C.G. SAFETY MARGINS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12224 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-79, 89; CR38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE LOGIC TALKBACK TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12225 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-79, 89; CR38

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE ISOLATION BETWEEN MANUAL CLOSE AND SWITCH TALKBACK DISPLAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12226 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-80, 90; CR31

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKBACK LOGIC TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12227

HIGHEST CRITICALITY	HDW/FUNC
FLIGHT:	3/3
ABORT:	3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                AFT MCA #3  
PART NUMBER:    J2-80, 90; CR31

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.    LOSE ISOLATION BETWEEN MANUAL OPEN AND SWITCH TALKBACK DISPLAY.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12228 ABORT: 3/1R

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-20, J2-71; CR37, CR36

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO CLOSE THE VALVE. MANUAL COMMANDING AND SECOND GPC COMMAND STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY ISOLATE A LEAK, WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12229 ABORT: 3/3

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-20, J2-71; CR37, CR36

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12230 ABORT: 2/1R

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-21; CR32

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO OPEN THE VALVE. MANUAL COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12232 ABORT: 2/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
DEORBIT:	3/2R	AUA:	3/2R

LANDING/SAFING: 3/3

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-57; CR28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO OPEN THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12233 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-57; CR28

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12234 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-22; CR41

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO CLOSE THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12235 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-22; CR41

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12236 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-57; CR27

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE CLOSE RELAYS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12237 ABORT: 3/1R

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-57; CR27

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE VALVES. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12238 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-22; CR42

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE OPEN RELAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12239 ABORT: 2/1R

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 3, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J2-22; CR42

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE WAS OPENED WITH THE GPC, LOSE CAPABILITY TO RE-OPEN THE VALVE. MANUAL SWITCH PROVIDES REDUNDANCY. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS AND/OR C.G. SAFETY MARGINS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12240 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-84, 68; CR25

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE LOGIC TALKBACK TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12241 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (OPEN CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-84, 68; CR25

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE ISOLATION BETWEEN MANUAL CLOSE AND SWITCH TALKBACK DISPLAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12242 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-85, 60; CR95

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKBACK LOGIC TO TURN MOTOR OFF. MOTOR CAN WITHSTAND CONTINUOUS POWER. VALVE MOVEMENT OPEN AND CLOSE STILL OPERABLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12243 ABORT: 3/3

ITEM: DIODE - LIMIT SWITCH (CLOSE CIRCUIT)  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-85, 60; C495

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE ISOLATION BETWEEN MANUAL OPEN AND SWITCH TALKBACK DISPLAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12244 ABORT: 3/1R

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J1-113, J3-64; CR34, CR35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO CLOSE THE VALVE. MANUAL COMMANDING AND SECOND GPC COMMAND STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY ISOLATE A THRUSTER LEAK, WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12245 ABORT: 3/3

ITEM: DIODE - GPC CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J1-113, J3-64; CR34, CR35

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12246

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/1R  
ABORT: 2/1R

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J1-56; CR96

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND TO OPEN THE VALVE. MANUAL COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY TO OPEN THE VALVE MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12247 ABORT: 3/3

ITEM: DIODE - GPC OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - GPC OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J1-56; CR96

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/1R
MDAC ID:	12248	ABORT:	2/1R

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      AFT MCA #3  
PART NUMBER:                J3-57; C4110

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE MANUAL COMMAND TO OPEN THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/3
MDAC ID:	12249	ABORT:	3/3

ITEM: DIODE - MANUAL OPEN  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES	
	HDW/FUNC	ABORT
PRELAUNCH:	3/3	RTLS: 3/3
LIFTOFF:	3/3	TAL: 3/3
ONORBIT:	3/3	AOA: 3/3
DEORBIT:	3/3	ATO: 3/3
LANDING/SAFING:	3/3	

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                      AFT MCA #3  
PART NUMBER:    J3-57; C4110

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES:    VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12250 ABORT: 3/1R

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-68; CR30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE MANUAL COMMAND TO CLOSE THE VALVE. GPC COMMANDING STILL AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A THRUSTER LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12251 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-68; CR30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12252 ABORT: 3/3

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-57; CR109

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE CLOSE RELAYS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12253 ABORT: 3/1R

ITEM: DIODE - MANUAL OPEN/CLOSE INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL OPEN/CLOSE INHIBIT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

P REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-57; CR109

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO CLOSE THE VALVE. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO ISOLATE A LEAK WHICH MAY LEAD TO LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12254 ABORT: 3/3

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-68; CR30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. LOSE "POWER OFF" INHIBIT TO THE OPEN RELAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12255 ABORT: 2/1R

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT  
FAILURE MODE: FAILS SHORT

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEM
- 4) MANIFOLD 4, L/R OX & FU ISOL VLVS
- 5) DIODE - MANUAL CLOSE/OPEN INHIBIT
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES	ABORT	HDW/FUNC
PRELAUNCH:	3/3		RTLS:	2/1R
LIFTOFF:	3/3		TAL:	2/1R
ONORBIT:	3/2R		AOA:	3/3
DEORBIT:	3/1R		ATO:	3/2R
LANDING/SAFING:	3/3			

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AFT MCA #3  
PART NUMBER: J3-68; CR30

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE VALVE WAS OPENED WITH THE GPC, LOSE CAPABILITY TO RE-OPEN THE VALVE. MANUAL SWITCH PROVIDES REDUNDANCY. LOSS OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET LANDING WEIGHT CONSTRAINTS AND/OR C.G. SAFETY MARGINS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12256 ABORT: 2/1R

ITEM: RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L1/L5/R1, RJDA1B
- 5) RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 015 S3  
PART NUMBER: 33V73A15S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ELECTRONIC AND BITE POWER AND CAUSES INABILITY TO INHIBIT DRIVER POWER FOR MANIFOLD 1 AND LEFTVERNIER. THIS CAUSES LOSS OF MANIFOLD 1 JETS AND LEFT VERNIER JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 2, 3, AND 4. NO VERNIER REDUNDANCY EXISTS. THIS MAY CAUSE LOSS OF MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12257 ABORT: 3/3

ITEM: RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L1/L5/R1, RJDA1B
- 5) RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 015 S3  
PART NUMBER: 33V73A15S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12258 ABORT: 3/3

ITEM: RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L1/L5/R1, RJDA1B
- 5) RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 015 S3  
PART NUMBER: 33V73A15S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12259 ABORT: 2/1R

ITEM: RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L1/L5/R1, RJDA1B
- 5) RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 015 S3  
PART NUMBER: 33V73A15S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

DURING RE-ENTRY, LOSE MANIFOLD 1 JET IF SWITCH INADVERTENTLY SWITCHED OFF. REDUNDANCY PROVIDED BY MANIFOLD 3 JETS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF CONTROL OF THE VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2





INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/3
MDAC ID:	12262	ABORT:	3/3

ITEM: RJDA1B L1/R1 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L1/R1, RJDA1B
- 5) RJDA1B L1/R1 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/33
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL 015 S4  
PART NUMBER:    33V73A15S4

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH INADVERTENTLY OPERATING ALONE HAS NO EFFECT.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/3
MDAC ID:	12263	ABORT:	3/3

ITEM: RJDA1B L1/R1 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

**BREAKDOWN HIERARCHY:**

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L1/R1, RJDA1B
- 5) RJDA1B L1/R1 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

B REDUNDANCY SCREENS:    A [    ]                      [    ]                      C [    ]

LOCATION:            PNL 015 S4  
PART NUMBER:    33V73A15S4

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH INADVERTENTLY OPERATING ALONE HAS NO EFFECT.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2







INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12266 ABORT: 2/1R

ITEM: RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S3  
PART NUMBER: 33V73A14S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ELECTRONIC AND BITE POWER AND CAUSES INABILITY TO INHIBIT DRIVER POWER. THIS CAUSES A LOSS OF JETS ON MANIFOLD 2. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 3, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY CONTROL.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12268 ABORT: 3/3

ITEM: RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 014 S3  
PART NUMBER: 33V73A14S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12269 ABORT: 2/1R

ITEM: RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S3  
PART NUMBER: 33V73A14S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH INADVERTENTLY SWITCHED OFF DURING ASCENT, LOSE CAPABILITY TO FIRE MANIFOLD 2 JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 3 AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/1R
MDAC ID:	12270	ABORT:	2/1R

ITEM: RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 014 S3  
PART NUMBER:                33V73A14S3

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, IT WILL BLOW THE ASSOCIATED 1 AMP FUSE. THEREFORE, LOSE 1 PATH FOR ELECTRONIC, BITE AND/OR DRIVER POWER. REDUNDANCY PROVIDED WITH OTHER CONTACT SET ON SWITCH. LOSS OF THIS REDUNDANCY CAUSES LOSS OF MANIFOLD 2 JETS. JET REDUNDANCY PROVIDED WITH MANIFOLD 1, 3, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12271 ABORT: 1/1

ITEM: RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S4  
PART NUMBER: 33V73A14S4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO TURN ON DRIVER POWER. THIS CAUSES LOSS OF JETS ON MANIFOLD 2. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 3, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY. FAILURE DURING RTLS/TAL MAY PREVENT ENOUGH PROPELLANT TO BE EXPELLED TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12272 ABORT: 3/3

ITEM: RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 014 S4  
PART NUMBER: 33V73A14S4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12273 ABORT: 3/3

ITEM: RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 014 S4  
PART NUMBER: 33V73A14S4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH INADVERTENTLY OPERATING ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12274 ABORT: 1/1

ITEM: RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S4  
PART NUMBER: 33V73A14S4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

DURING ASCENT, LOSE CAPABILITY TO FIRE MANIFOLD 2 JETS.  
REDUNDANCY PROVIDED BY JETS ON MANIFOLD 3 AND 4. LOSS OF ALL  
REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION.  
FAILURE DURING RTLS/TAL MAY PREVENT ENOUGH PROPELLANT TO BE  
EXPULSED TO MEET LANDING WEIGHT CONSTRAINT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE  
SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
 SUBSYSTEM: ARCS  
 MDAC ID: 12275

HIGHEST CRITICALITY  
 FLIGHT: 3/1R  
 ABORT: 1/1

ITEM: RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4  
 FAILURE MODE: SWITCH FAILS SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L2/R2, RJDA1A
- 5) RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 014 S4  
 PART NUMBER:                33V73A14S4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, IT WILL BLOW THE ASSOCIATED FUSE (1 AMP OR 2 AMP). THEREFORE, LOSS 1 PATH FOR DRIVER POWER. REDUNDANCY PROVIDED WITH OTHER CONTACT SET ON SWITCH. LOSS OF THIS REDUNDANCY CAUSES LOSS OF MANIFOLD 2 JETS. JET REDUNDANCY PROVIDED WITH MANIFOLDS 1, 3, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY. FAILURE DURING RTLS/TAL MAY PREVENT ENOUGH PROPELLANT TO BE EXPELLED TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12276 ABORT: 2/1R

ITEM: RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3/R5, RJDA2B
- 5) RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S3  
PART NUMBER: 33V73A16S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ELECTRONIC AND BITE POWER AND CAUSES INABILITY TO INHIBIT DRIVER POWER FOR MANIFOLD 3 AND RIGHT VERNIER. THIS CAUSES LOSS OF MANIFOLD 1 JETS AND RIGHT VERNIER JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 2, AND 4. NO REDUNDANCY FOR VERNIER JETS. THIS MAY CAUSE LOSS OF MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12277 ABORT: 3/3

ITEM: RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3/R5, RJDA2B
- 5) RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGH PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S3  
PART NUMBER: 33V73A16S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12278 ABORT: 3/3

ITEM: RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3/R5, RJDA2B
- 5) RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S3  
PART NUMBER: 33V73A16S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12279 ABORT: 2/1R

ITEM: RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3/R5, RJDA2B
- 5) RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 016 S3  
PART NUMBER: 33V73A16S3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE JETS ON MANIFOLD 3. REDUNDANCY PROVIDED BY JETS ON MANIFOLD 1, 2, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	2/2
MDAC ID:	12280	ABORT:	2/1R

ITEM: RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3  
FAILURE MODE: SWITCH FAILS SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3/R5, RJDA2B
- 5) RJDA2B L3/R3/R5 MANIFOLD LOGIC SWITCH 3
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	2/2	AOA:	3/1R
DEORBIT:	3/1R	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL 016 S3  
PART NUMBER:    33V73A16S3

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE ASSOCIATED 1 AMP FUSE WILL BLOW. THIS CAUSES LOSS OF ONE ELECTRICAL PATH TO TURN ON ELECTRONIC, BITE, AND DRIVER POWER FOR MANIFOLD 3 JETS AND CAUSES LOSS OF RIGHT VERNIERS. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 2, AND 4. NO REDUNDANCY PROVIDED FOR VERNIER JETS. THIS MAY CAUSE LOSS OF MISSION OBJECTIVES.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
 SUBSYSTEM: ARCS  
 MDAC ID: 12281

HIGHEST CRITICALITY  
 FLIGHT: 3/1R  
 ABORT: 1/1

ITEM: RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4  
 FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3, RJDA2B
- 5) RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3		RTL: 1/1
LIFTOFF:	3/1R		TAL: 1/1
ONORBIT:	3/2R		AOA: 3/1R
DEORBIT:	3/1R		ATO: 3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 016 S4  
 PART NUMBER:                33V73A16S4

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO TURN ON MANIFOLD 3 DRIVER POWER. THIS CAUSES LOSS OF JETS ON MANIFOLD 3. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 2, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY. DURING RTL/TAL, JETS ARE REQUIRED TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12282 ABORT: 3/3

ITEM: RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3, RJDA2B
- 5) RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S4  
PART NUMBER: 33V73A16S4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12283 ABORT: 3/3

ITEM: RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3, RJDA2B
- 5) RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 016 S4  
PART NUMBER: 33V73A16S4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH INADVERTENTLY OPERATING ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM: ARCS	FLIGHT:	3/1R
MDAC ID: 12284	ABORT:	1/1

ITEM: RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3, RJDA2B
- 5) RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]            B [ P ]            C [ P ]

LOCATION:            PNL 016 S4  
PART NUMBER:    33V73A16S4

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE JETS ON MANIFOLD . REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 2, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY. DURING RTLS/TAL, JETS ARE REQUIRED TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
 SUBSYSTEM: ARCS  
 MDAC ID: 12285

HIGHEST CRITICALITY HDW/FUNC  
 FLIGHT: 3/1R  
 ABORT: 1/1

ITEM: RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4  
 FAILURE MODE: SWITCH FAILS SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L3/R3, RJDA2B
- 5) RJDA2B L3/R3 MANIFOLD DRIVER SWITCH 4
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                      PNL 016 S4  
 PART NUMBER:                33V73A16S4

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, THE ASSOCIATED FUSE (1 AMP OR 2 AMP) WILL BLOW. THEREFORE, LOSE ONE PATH FOR DRIVER POWER. REDUNDANCY PROVIDED WITH OTHER CONTACT SET ON SWITCH. LOSS OF THIS REDUNDANCY CAUSES LOSS OF MANIFOLD 3 JETS. JET REDUNDANCY PROVIDED WITH MANIFOLDS 1, 2, AND 4. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY DURING RTLS/TAL, JETS ARE REQUIRED TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/1R
MDAC ID:	12286	ABORT:	2/1R

ITEM: RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]                      B [ P ]                      C [ P ]

LOCATION:                PNL 014 S5  
PART NUMBER:        33V73A14S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ELECTRONIC AND BITE POWER AND CAUSES INABILITY TO INHIBIT DRIVER POWER. THIS CAUSES LOSS OF MANIFOLD 4 JETS. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 2, AND 3. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12287 ABORT: 3/3

ITEM: RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 014 S5  
PART NUMBER: 33V73A14S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12288 ABORT: 3/3

ITEM: RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL 014 S5  
PART NUMBER: 33V73A14S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/1R
MDAC ID:	12289	ABORT:	2/1R

ITEM: RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [ 2 ]            B [ P ]            C [ P ]

LOCATION:            PNL 014 S5  
PART NUMBER:    33V73A14S5

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

DURING ASCENT, LOSE JETS ON MANIFOLD 4. MANIFOLD 2 JETS PROVIDED REDUNDANCY FOR -Z THRUST REQUIRED FOR ET SEPARATION.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12290 ABORT: 2/1R

ITEM: RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5  
FAILURE MODE: SWITCH FAILS SHORT TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD LOGIC SWITCH 5
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S5  
PART NUMBER: 33V73A14S5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF SWITCH SHORTS TO CASE, IT WILL BLOW THE ASSOCIATED 1 AMP FUSE. THIS CAUSES LOSS OF ONE ELECTRICAL PATH FOR ELECTRONIC, BITE AND/OR DRIVER POWER. REDUNDANCY PROVIDED WITH OTHER CONTACT SET ON SWITCH. LOSS OF THIS REDUNDANCY CAUSES LOSS OF MANIFOLD 4 JETS. JET REDUNDANCY PROVIDED WITH MANIFOLDS 1, 2, AND 3. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12291 ABORT: 1/1

ITEM: RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S6  
PART NUMBER: 33V73A14S6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO TURN ON DRIVER POWER. THIS CAUSE LOSS OF JETS ON MANIFOLD 4. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 1, 2, AND 3. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY. FAILURE DURING RTLS/TAL MAY PREVENT ENOUGH PROPELLANTS TO BE EXPELLED TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	3/3
MDAC ID:	12292	ABORT:	3/3

ITEM: RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:                PNL 014 S6  
PART NUMBER:        33V73A14S6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
SWITCH FAILED SHORT ALONE HAS NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
 SUBSYSTEM: ARCS  
 MDAC ID: 12293

HIGHEST CRITICALITY HDW/FUNC  
 FLIGHT: 3/3  
 ABORT: 3/3

ITEM: RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6  
 FAILURE MODE: SWITCH FAILS SORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICA COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]                      B [    ]                      C [    ]

LOCATION:            PNL 014 S6  
 PART NUMBER:    33V73A14S6

CAUSES:    CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
 SWITCH INADVERTENTLY OPERATING ALONE HAS NO EFFECT.

REFERENCES:    VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12294 ABORT: 1/1

ITEM: RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L4/R4, RJDA2A
- 5) RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL 014 S6  
PART NUMBER: 33V73A14S6

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

DURING ASCENT, LOSE JETS ON MANIFOLD 4, JETS ON MANIFOLD 2 PROVIDE -Z THRUST REDUNDANCY REQUIRED FOR ET SEPARATION. FAILURE DURING RTLS/TAL PREVENTS ENOUGH PROPELLANTS TO BE EXPELLED TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2





INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12296 ABORT: 3/2R

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 9  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 9
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S9  
PART NUMBER: 36V73A14S9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 1 MAY FREEZE, CAUSING LOSS OF JETS ON THE MANIFOLD. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12297 ABORT: 3/3

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 9  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 9
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S9  
PART NUMBER: 36V73A14S9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12298 ABORT: 3/2R

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 9  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 9
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S9  
PART NUMBER: 36V73A14S9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 1 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12299 ABORT: 3/3

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 9  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 9
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S9  
PART NUMBER: 36V73A14S9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
:a0576HSUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12300 ABORT: 3/2R

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 9  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 1, JETS
- 5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 9
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S9  
PART NUMBER: 36V73A14S9

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 1 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 1 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12301 ABORT: 3/2R

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 10  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S10  
PART NUMBER: 36V73A14S10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 2 MAY FREEZE, CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12302 ABORT: 3/3

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 10  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S10  
PART NUMBER: 36V73A14S10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12303 ABORT: 3/2R

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 10  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S10  
PART NUMBER: 36V73A14S10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 2 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12304 ABORT: 3/3

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 10  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S10  
PART NUMBER: 36V73A14S10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12305 ABORT: 3/2R

ITEM: MANIFOLD 2, JETS HEATER CONTROL SWITCH 10  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 2, JETS
- 5) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S10  
PART NUMBER: 36V73A14S10

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 1 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 2 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12306 ABORT: 3/2R

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 11  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 11
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S11  
PART NUMBER: 36V73A14S11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 3 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12307 ABORT: 3/3

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 11  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 11
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S11  
PART NUMBER: 36V73A14S11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12308 ABORT: 3/2R

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 11  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 11
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S11  
PART NUMBER: 36V73A14S11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 3 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12309 ABORT: 3/3

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 11  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 11
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S11  
PART NUMBER: 36V73A14S11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12310 ABORT: 3/2R

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 11  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CAES)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 3, JETS
- 5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 11
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S11  
PART NUMBER: 36V73A14S11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 1 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 3 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12311 ABORT: 3/2R

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 12  
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 12
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S12  
PART NUMBER: 36V73A14S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN JETS ON MANIFOLD 4 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REAMINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12312 ABORT: 3/3

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 12  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 12
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S12  
PART NUMBER: 36V73A14S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12313 ABORT: 3/2R

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWICH 12  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 12
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S12  
PART NUMBER: 36V73A14S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN MANIFOLD 4 MAY FREEZE CAUSING LOSS OF JETS. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERAITONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12314 ABORT: 3/3

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 12  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 12
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S12  
PART NUMBER: 36V73A14S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12315 ABORT: 3/2R

ITEM: MANIFOLD 4, JETS HEATER CONTROL SWITCH 12  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 4, JETS
- 5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 12
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PNL A14 S12  
PART NUMBER: 36V73A14S12

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 1 AMP FUSE. PROPELLANTS IN MANIFOLD 4 MAY FREEZE CAUSING LOSS OF JET. REDUNDANCY PROVIDED BY JETS ON REMAINING THREE MANIFOLDS. LOSS OF ALL REDUNDANCY MAY PREVENT ON-ORBIT OPERATIONS THUS MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12317 ABORT: 3/3

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 13  
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 13
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S13  
PART NUMBER: 36V73A14S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT. REQUIRES ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	10/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS	FLIGHT:	2/2
MDAC ID:	12318	ABORT:	2/2

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 13  
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN                      SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 13
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	HDW/FUNC	CRITICALITIES ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS:    A [    ]            B [    ]            C [    ]

LOCATION:            PNL A14 S13  
PART NUMBER:    36V73A14S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

PROPELLANTS IN MANIFOLD 5 MAY FREEZE CAUSING LOSS OF JETS. NO REDUNDANCY PROVIDED FOR AFT VERNIERS. THIS MAY CAUSE LOSS OF MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12319

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: 3/3

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 13  
FAILURE MODE: SWITCH INADVERTENTLY OPENS/CLOSES (WORST CASE)

LEAD ANALYST: D. HARTMAN  
SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 13
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S13  
PART NUMBER: 36V73A14S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12320 ABORT: 2/2

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 13  
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THERMAL CONTROL SUBSYSTEM
- 4) MANIFOLD 5, JETS
- 5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 13
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PNL A14 S13  
PART NUMBER: 36V73A14S13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

SHORT TO CASE WILL BLOW 1 AMP FUSE. PROPELLANTS IN JETS ON MANIFOLD 5 MAY FREEZE CAUSING LOSS OF JETS. NO REDUNDANCY PROVIDED FOR AFT VERNIERS. THIS MAY CAUSE LOSS OF MISSION OBJECTIVES.

REFERENCES: VS70-943099 REV B EO B12, CP; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PG 11.10, RCS SIG 2

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12321 ABORT: 1/1

ITEM: SIGNAL CONDITIONER OL1  
FAILURE MODE: INCORRECT OR LOSS OF OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER, AFT
- 5) SIGNAL CONDITIONER OL1
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: LEFT OMS POD  
PART NUMBER: 51V75A25

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

CHAMBER PRESSURE SENSOR DATA IS ROUTED THROUGH SIGNAL CONDITIONER. DATA RECEIVED AT GPC CAN DESELECT JET. THEREFORE, INCORRECT DATA MAY DESELECT +Y OR -Z JET. REDUNDANCY PROVIDED BY JETS ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED FOR RE-ENTRY. DESELECTION OF JET DURING RTLS/TAL MAY CAUSE INABILITY TO COMPLETE OMS/RCS ABORT DUMP.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12322 ABORT: 1/1

ITEM: SIGNAL CONDITIONER OL2  
FAILURE MODE: INCORRECT OR LOSS OF OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER, AFT
- 5) SIGNAL CONDITIONER OL2
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: LEFT OMS POD  
PART NUMBER: 51V75A77

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

CHAMBER PRESSURE SENSOR DATA IS ROUTED THROUGH SIGNAL CONDITIONER. DATA RECEIVED AT GPC CAN DESELECT JET. THEREFORE, INCORRECT DATA MAY DESELECT +Y OR -Z JET. REDUNDANCY PROVIDED BY JETS ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR RE-ENTRY. DESELECTION OF JET DURING RTLS/TAL MAY CAUSE INABILITY TO COMPLETE AN OMS/RCS ABORT DUMP.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12323 ABORT: 1/1

ITEM: SIGNAL CONDITIONER OR1  
FAILURE MODE: INCORRECT OR LOSS OF OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER, AFT
- 5) SIGNAL CONDITIONER OR1
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: RIGHT OMS POD  
PART NUMBER: 52V75A24

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

CHAMBER PRESSURE SENSOR DATA IS ROUTED THROUGH SIGNAL CONDITIONER. DATA RECEIVED AT GPC CAN DESELECT JET. THEREFORE, INCORRECT DATA MAY DESELECT +Y OR -Z JET. REDUNDANCY PROVIDED BY JETS ON DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED FOR RE-ENTRY. DESELECTION OF JET DURING RTLS/TAL MAY CAUSE INABILITY TO COMPLETE OMS/RCS ABORT DUMPS.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12324 ABORT: 1/1

ITEM: SIGNAL CONDITIONER OR2  
FAILURE MODE: INCORRECT OR LOSS OF OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER, AFT
- 5) SIGNAL CONDITIONER OR2
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/1R	TAL:	1/1
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: RIGHT OMS POD  
PART NUMBER: 52V75A78

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

CHAMBER PRESSURE SENSOR DATA IS ROUTED THROUGH SIGNAL CONDITIONER. DATA RECEIVED AT GPC CAN DESELECT JET. THEREFORE, INCORRECT DATA MAY DESELECT +Y OR -Z JET. REDUNDANCY PROVIDED BY JET ON DIFFERENT MANIFOLD. LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED FOR RE-ENTRY. DESELECTION OF JET DURING RTLS/TAL MAY CAUSE INABILITY TO COMPLETE OMS/RCS ABORT DUMP.

REFERENCES: VS70-942099 REV D EO D01

REPORT DATE : 2/26/88

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INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: /  
MDAC ID: 12325 ABORT: /

ITEM: JET DRIVER (PRIMARY-ALL)  
FAILURE MODE: JET DRIVER FAILS OFF

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER, AFT
- 5) JET DRIVER (PRIMARY-ALL)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/	RTLS:	/
LIFTOFF:	/	TAL:	/
ONORBIT:	/	AOA:	/
DEORBIT:	/	ATO:	/
LANDING/SAFING:	/		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: WITHIN RJDA #1 OR RJDA #2  
PART NUMBER: 54V79A10 AND 56V79A11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSS OF JET ASSOCIATED WITH +Y, -Y, OR -Z THRUST COMPONENT IS THE WORST CASE. REDUNDANCY FOR JET PROVIDED BY JET ON DIFFERENT MANIFOLD. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS. LOSS OF THRUSTER DURING RTLS/TAL ABORT CAUSES INABILITY TO COMPLETE A OMS DUMP.

REFERENCES: VS70-942099 REV D EO D01



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: /  
MDAC ID: 12327 ABORT: /

ITEM: JET DRIVER (VERNIER-ALL)  
FAILURE MODE: JET DRIVER FAILS OFF

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER, AFT
- 5) JET DRIVER (VERNIER-ALL)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/	RTLS:	/
LIFTOFF:	/	TAL:	/
ONORBIT:	/	AOA:	/
DEORBIT:	/	ATO:	/
LANDING/SAFING:	/		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: WITHIN RJDA #1 OR RJDA #2  
PART NUMBER: 54V79A10 AND 56V79A11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE JET ASSOCIATED WITH +Y AND -Y VERNIER THRUST COMPONENT. NO REDUNDANCY PROVIDED. THIS MAY CAUSE LOSS OF MISSION OBJECTIVES DUE TO LOSS OF VERNIERS.

REFERENCES: VS70-942099 REV D EO D01



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12338 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R MANIFOLD 3, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 51V42LV238, 51V42LV237, 52V42LV338, 52V42LV337  
PART NUMBER: J1-F (4 MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILED MICROSWITCH PREVENTS ACCURATE VALVE POSITION DATA.  
REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF TALKBACK MAY LEAD TO  
FALSELY FAILING THE VALVE CLOSED THUS LIMITING ON-ORBIT  
OPERATIONS.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: /  
MDAC ID: 12328 ABORT: /

ITEM: JET DRIVER (VERNIER-ALL)  
FAILURE MODE: JET DRIVER FAILS ON

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER, AFT
- 5) JET DRIVER (VERNIER-ALL)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/	RTLS:	/
LIFTOFF:	/	TAL:	/
ONORBIT:	/	AOA:	/
DEORBIT:	/	ATO:	/
LANDING/SAFING:	/		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: WITHIN RJDA #1 OR RJDA #2  
PART NUMBER: 54V79A10 AND 56V79A11

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

JET DRIVER FAILED ON WILL PROVIDE LATCHING ENERGY TO BI-PROPELLANT VALVES ALLOWING FIRING. CREW MUST ISOLATE PROPELLANT BY CLOSING MANIFOLD 5 ISOLATION VALVE. INADVERTENT FIRING DURING ANY MISSION PHASE MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/1R  
MDAC ID: 12329 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV B
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 51V42LV201, 51V42LV202, 51V42LV203, 51V42LV204  
PART NUMBER: J1-1 (8 DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE DIODE REQUIRED TO OPEN THE VALVE. REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF THIS MAY CAUSE INABILITY TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/3  
MDAC ID: 12330 ABORT: 3/3

ITEM: DIODE  
FAILURE MODE: FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV B
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 51V42LV201, 51V42LV202, 51V42LV203, 51V42LV204  
PART NUMBER: J1-1 (8 DIODES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
NO EFFECT.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12331 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV A OR B
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 51V42LV201, 51V42LV202, 51V42LV203, 51V42LV204  
PART NUMBER: J1-6 (4 MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILED MICROSWITCH PREVENTS ACCURATE VALVE POSITION DATA.  
REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF TALKBACK MAY LEAD TO  
FALSELY FAILING THE VALVE CLOSED THUS LIMITING ON-ORBIT  
OPERATIONS.

REFERENCES: VS70-942099 REV D EO D01



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12333 ABORT: 3/1R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R OX & FU ISOL TK 3/4/5 A & B
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 51V42LV265, 51V42LV266, 51V42LV263, 51V42LV264  
PART NUMBER: J1-F (EIGHT MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

MICROSWITCH FAILED ACROSS THE OPEN CONTACTS PREVENTS VALVE FROM BEING OPENED. HARDWARE REDUNDANCY PROVIDED BY SECOND LEG OF 3/4/5 AND 1/2 VALVE. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR RE-ENTRY CONTROL.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12334 ABORT: 3/1R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R OX & FU CROSSFEED VLV 1/2
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [NA ] C [ P ]

LOCATION: 51V42LV371, 51V42LV372, 51V42LV271, 51V42LV272  
PART NUMBER: J1-F (4 MICROSWITCHES), J1-K (4 MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

MICROSWITCH FAILED ACROSS CLOSED CONTACTS PREVENTS VALVE FROM BEING CLOSED. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-942099 REV D EO D01



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12335 ABORT: 3/1R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R OX & FU CROSSFEED VLV 3/4/5
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 51V42LV373, 51V42LV374, 51V42LV273, 51V42LV274  
PART NUMBER: J1-F (4 MICROSWITCHES), J1-K (4 MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
MICROSWITCH FAILED ACROSS CLOSED CONTACTS PREVENTS VALVE FROM BEING CLOSED TO ISOLATE A THRUSTER LEAK.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12336 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R MANIFOLD 1, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: 52V42LV317, 52V42LV318  
PART NUMBER: J1-F (4 MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILED MICROSWITCH PREVENTS ACCURATE VALVE POSITION DATA. REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF TALKBACK MAY LEAD TO FALSELY FAILING THE VALVE CLOSED THUS LIMITING ON-ORBIT OPERATIONS.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12337 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R MANIFOLD 2, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 52V42LV327, 52V42LV328  
PART NUMBER: J1-F (4 MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILED MICROSWITCH PREVENTS ACCURATE VALVE POSITION DATA. REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF TALKBACK MAY LEAD TO FALSELY FAILING THE VALVE CLOSED THUS LIMITING ON-ORBIT OPERATIONS.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/2R  
MDAC ID: 12339 ABORT: 3/2R

ITEM: MICROSWITCH  
FAILURE MODE: ERRONEOUS OUTPUT (WORST CASE)

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R MANIFOLD 4, OX & FU ISOL VLVS.
- 5) MICROSWITCH
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: 51V42LV248, 51V42LV247, 52V42LV348, 52V42LV347  
PART NUMBER: J1-F (4 MICROSWITCHES)

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

FAILED MICROSWITCH PREVENTS ACCURATE VALVE POSITION DATA.  
REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF TALKBACK MAY LEAD TO FALSELY FAILING THE VALVE CLOSED THUS LIMITING ON-ORBIT OPERATIONS.

REFERENCES: VS70-942099 REV D EO D01

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12340 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV A
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A2CR5; A3CR4

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT TO OPEN ISOLATION VALVE. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF ALL REDUNDANCY CAUSES INABILITY TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12341 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV A
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A2CR6; A3CR5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT TO OPEN ISOLATION VALVE. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF ALL REDUNDANCY CAUSES INABILITY TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12342 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) L/R HE OX & FU ISOL VLV B
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2  
PART NUMBER: 54V76A133A2CR16; 54V76A132A3CR22

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT TO OPEN ISOLATION VALVE. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF ALL REDUNDANCY CAUSES INABILITY TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12343 ABORT: 3/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) L/R HE OX & FU ISOL VLV B
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, PCA 3; AV BAY 5, PCA 2  
PART NUMBER: 56V76A133A2CR15; 55V76A132A3CR23

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT TO OPEN ISOLATION VALVE. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY OTHER VALVE. LOSS OF ALL REDUNDANCY CAUSES INABILITY TO EXPEL PROPELLANTS TO MEET LANDING WEIGHT CONSTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12344 ABORT: 2/2

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) PROP STOR & DIST SUBSYSTEMS
- 4) MANIFOLD 5, L/R OX & FU ISOL VLVS
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133AJ8-Z, J8-M

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO OPEN ISOLATION VALVE. INABILITY TO OPEN ISOLATION VALVE PREVENTS VRCS OPERATION THUS LOSS OF MISSION.

REFERENCES: ECN 102-8023A

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12345 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A3CR1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 1 DIRVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

REPORT DATE : 2/26/88

E-608

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12346 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, PCA 2  
PART NUMBER: 55V76A131A3CR1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 1 DIRVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12347 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, PCA 2  
PART NUMBER: 55V76A132A2CR7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 1 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12348 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 1/L5, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, PCA 2  
PART NUMBER: 55V76A132A2CR8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 1 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12349 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, PCA 2  
PART NUMBER: 56V76A133A2CR2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 2 DRIVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12350 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

	CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A2CR1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 2 DRIVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12351 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A3CR8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 2 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12352 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 2, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A3CR7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 2 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12353 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 5, PCA 2  
PART NUMBER: 55V76A132A2CR1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 DRIVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12354 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133A3CR1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 DRIVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12355 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3/R5, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133A3CR8

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12356 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 3/R5, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133A3CR7

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 3 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12357 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A2CR2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 4 DRIER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12358 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 6, PCA 3  
PART NUMBER: 56V76A133A2CR1

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 4 DRIVER POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12359 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 3, PCA 3  
PART NUMBER: 56V76A133A3CR13

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 4 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 3/1R  
MDAC ID: 12360 ABORT: 2/1R

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD 4, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	3/1R	TAL:	2/1R
ONORBIT:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/2R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: AV BAY 3, PCA 3  
PART NUMBER: 56V76A133A3CR5

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ONE CIRCUIT FOR MANIFOLD 4 LOGIC POWER. ELECTRICAL REDUNDANCY PROVIDED. HARDWARE REDUNDANCY PROVIDED BY JETS ON OTHER MANIFOLDS. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED FOR ET SEPARATION AND RE-ENTRY.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12361 ABORT: 2/2

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD L5, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 4, PCA 1  
PART NUMBER: 54V76A131A3CR2

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE DRIVER POWER TO LEFT MANIFOLD 5 JETS. THIS LOSS OF  
JETS ON MANIFOLD 5 THUS LOSS OF MISSION.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: ARCS FLIGHT: 2/2  
MDAC ID: 12362 ABORT: 2/2

ITEM: DIODE  
FAILURE MODE: FAILS SHORT TO GROUND

LEAD ANALYST: D. HARTMAN SUBSYS LEAD: C.D. PRUST

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) THRUSTER SUBSYSTEM
- 4) MANIFOLD R5, RJDA
- 5) DIODE
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 5, PCA 2  
PART NUMBER: 54V76A131A3CR3

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:  
LOSE DRIVER POWER TO RIGHT MANIFOLD 5 JETS. THIS CAUSES LOSS OF JETS ON MANIFOLD 5 THUS LOSS OF MISSION.

REFERENCES: VS70-943099 REV B EO B12, JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK



## APPENDIX F

### NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS

This section provides a cross reference between the NASA FMEA and the corresponding IOA assessment worksheets included in Appendix C. The Appendix F identifies: NASA FMEA Number, IOA Assessment Number, NASA criticality and redundancy screen data, IOA recommended criticalities and redundancy screens, and issue codes.

#### HARDWARE ISSUE CODES

- |       |  |
|-------|--|
| HDW 1 | IOA recommends that this failure mode be upgraded to a CIL item. |
| HDW 2 | IOA recommends a criticality and/or screen upgrade.              |
| HDW 3 | IOA recommends a criticality and/or screen downgrade.            |
| HDW 4 | IOA recommends that this failure mode be added to the FMEA/CIL.  |
| HDW 5 | IOA recommends that this item be added to the FMEA/CIL.          |
| HDW 6 | IOA recommends editorial revisions to this FMEA/CIL.             |
| HDW 7 | IOA recommends a 1/1 abort criticality for this failure mode.    |
| HDW 8 | NASA/RI added this new FMEA and CIL per IOA issue.               |

#### EPD&C ISSUE CODES

- |         |  |
|---------|--|
| EPD&C 1 | IOA recommends a 3/2R PPP for this failure mode (loss of talkback data leading to falsely failing a valve closed). |
| EPD&C 2 | IOA recommends a downgrade for this FMEA/CIL based on IOA interpretation of NSTS 22206.                            |
| EPD&C 3 | IOA recommends an upgrade or an addition of other failure scenarios that have 1R or CIL criticalities.             |
| EPD&C 4 | This EPD&C issue is tied to a IOA hardware issue.  |
| EPD&C 5 | IOA recommends this item and failure be added to the FMEA/CIL.   |
| EPD&C 6 | IOA recommends a criticality/screen upgrade to the FMEA/CIL.   |

APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - FORWARD HARDWARE

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
03-2F-101010-1	FRCS-100	1/1									
03-2F-101013-1	FRCS-105	1/1									
	FRCS-107	1/1									
03-2F-101020-3	FRCS-103	3/1R	P	P	P	3/1R	P	F	P	HDW 1	X
03-2F-101020-4	FRCS-104	3/1R	P	P	P	2/1R	P	P	P	HDW 1	X
03-2F-101030-1	FRCS-10004X	3/1R	P	F	P						
	FRCS-111	3/1R	P	F	P						
03-2F-101030-2	FRCS-112	3/1R	P	P	P	2/1R	P	F	P	HDW 1	X
03-2F-101050-1	FRCS-144	3/3									
	FRCS-145	3/3									
03-2F-101060-1	FRCS-10001X	1/1									
	FRCS-10009X	1/1				1/1				HDW 5	X
	FRCS-10007X	2/1R	P	NA	P						
03-2F-101060-3	FRCS-141	3/1R	F	NA	P						
03-2F-101060-4	FRCS-141A	3/1R	P	NA	P						
03-2F-101060-5	FRCS-140A	2/1R	P	F	P						
03-2F-101070-1	FRCS-101	2/1R	F	F	P						
03-2F-101070-2	FRCS-102	3/3									
03-2F-101080-1	FRCS-159	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	FRCS-163	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	FRCS-167	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	FRCS-171	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	FRCS-175	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
03-2F-101080-2	FRCS-160	3/3				3/3				HDW 4	X
	FRCS-164	3/3				3/3				HDW 4	X
	FRCS-168	3/3				3/3				HDW 4	X
	FRCS-172	3/3				3/3				HDW 4	X
	FRCS-176	3/3				3/3				HDW 4	X
03-2F-101090-1	FRCS-130	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
03-2F-101090-2	FRCS-131	3/3				3/3				HDW 4	X
03-2F-101091-1	FRCS-109	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	FRCS-117	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	FRCS-121	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	FRCS-142	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
03-2F-101091-2	FRCS-110	3/3				3/3				HDW 4	X
	FRCS-118	3/3				3/3				HDW 4	X
	FRCS-122	3/3				3/3				HDW 4	X
	FRCS-143	3/3				3/3				HDW 4	X
03-2F-101095-1	FRCS-119	3/3				2/1R	P	F	P	HDW 1	X
03-2F-101095-2	FRCS-120	3/1R	P	F	P	2/1R	P	F	P	HDW 2	X
03-2F-101095-3	FRCS-10005X	2/1R	P	P	P	1/1				HDW 2, 8	X
03-2F-102106-1	FRCS-138	1/1									
03-2F-102108-1	FRCS-124	1/1									
03-2F-102110-1	FRCS-158	3/1R	P	P	P	2/1R	P	P	P	HDW 1	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
03-2F-102110-1	FRCS-162	3/1R	P	P	P	2/1R	P	P	P	HDW 1	X
	FRCS-166	3/1R	P	P	P	2/1R	P	P	P	HDW 1	X
	FRCS-170	3/1R	P	P	P	2/1R	P	P	P	HDW 1	X
03-2F-102110-2	FRCS-157	3/1R	P	NA	P						
	FRCS-161	3/1R	P	NA	P						
	FRCS-165	3/1R	P	NA	P						
	FRCS-169	3/1R	P	NA	P						
03-2F-102110-3	FRCS-10012X	3/3				1/1				HDW 1	X
03-2F-102112-1	FRCS-147	1/1				1/1				HDW 5	X
	FRCS-177	1/1				1/1				HDW 5	X
03-2F-102120-1	FRCS-148	3/1R	P	P	P	2/1R	P	P	F	HDW 1	X
	FRCS-150	3/1R	P	P	P	2/1R	P	P	P	HDW 1	X
	FRCS-152	3/1R	P	P	P	2/1R	P	P	P	HDW 1	X
03-2F-102120-2	FRCS-149	3/1R	P	NA	P						
	FRCS-151	3/1R	P	NA	P						
03-2F-102120-3	FRCS-10010X	3/3				2/1R	P	NA	P	HDW 1	X
03-2F-102150-1	FRCS-126	2/1R	F	F	P						
	FRCS-132	2/1R	F	F	P						
	FRCS-134	2/1R	F	F	P						
	FRCS-136	2/1R	F	F	P						
	FRCS-153	2/1R	F	F	P						
	FRCS-155	2/1R	F	F	P						
03-2F-102150-2	FRCS-127	3/3				3/3				HDW 4	X
	FRCS-133	3/3				3/3				HDW 4	X
	FRCS-135	3/3				3/3				HDW 4	X
	FRCS-137	3/3				3/3				HDW 4	X
	FRCS-154	3/3				3/3				HDW 4	X
	FRCS-156	3/3				3/3				HDW 4	X
03-2F-102170-1	FRCS-174	2/2									
03-2F-102170-2	FRCS-173	3/2R	P	P	P	3/1R	P	NA	P	HDW 2	X
03-2F-102170-3	FRCS-177A	1/1				1/1				HDW 5	X
03-2F-111110-1	FRCS-123	1/1									
03-2F-111110-3	FRCS-128	1/1								HDW 6	X
03-2F-121308-1	FRCS-179	1/1								HDW 6	X
03-2F-121310-1	FRCS-10116X	3/3				1/1				HDW 1	X
03-2F-121310-2	FRCS-181	3/1R	F	P	P	1/1				HDW 2	X
	FRCS-185	3/1R	F	P	P	1/1				HDW 2	X
	FRCS-187	3/1R	F	P	P	1/1				HDW 2	X
	FRCS-189	3/1R	F	P	P	1/1				HDW 2	X
	FRCS-188	3/1R	F	P	P						
03-2F-121310-3	FRCS-10015X	3/1R	F	P	P	3/2R	F	P	P	HDW 3	X
	FRCS-184	3/1R	F	P	P	3/2R	F	P	P	HDW 3	X
	FRCS-186	3/1R	F	P	P	2/1R	F	P	P	HDW 2	X
03-2F-121312-1	FRCS-197	1/1									
03-2F-121313-1	FRCS-197A	1/1									
03-2F-131310-1	FRCS-193	2/2									
	FRCS-196	2/2									
03-2F-131310-2	FRCS-192	2/2				1/1				HDW 2	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
03-2F-131310-2	FRCS-195	2/2				1/1				HDW 2	X
03-2F-131310-4	FRCS-198	1/1									
NONE	FRCS-10002X					2/1R	P	F	F	HDW 4	X
	FRCS-10003X					1/1				HDW 5	X
	FRCS-10006X					1/1				HDW 5	X
	FRCS-10008X					3/1R	F	NA	P	HDW 4	X
	FRCS-10011X										
	FRCS-10013X										
	FRCS-10014X					2/1R	P	NA	P	HDW 4	X
	FRCS-10016X										
	FRCS-10017X										
	FRCS-10018X					1/1				HDW 5	X
	FRCS-10019X					1/1				HDW 5	X
	FRCS-10042X					1/1				HDW 4	X
	FRCS-103A					3/1R	P	F	P	HDW 4	X
	FRCS-106										
	FRCS-108										
	FRCS-113					2/1R	P	F	P	HDW 4	X
	FRCS-114					1/1				HDW 5	X
	FRCS-115					3/2R	P	F	P	HDW 4	X
	FRCS-116										
	FRCS-125										
	FRCS-129										
	FRCS-139										
	FRCS-140					2/1R	P	F	P	HDW 4	X
	FRCS-146					1/1				HDW 5	X
	FRCS-149A					3/1R	P	NA	P	HDW 4	X
	FRCS-151A					3/1R	P	NA	P	HDW 4	X
	FRCS-178					2/2				HDW 4	X
	FRCS-180										
	FRCS-182					1/1				HDW 5	X
	FRCS-183					2/1R	F	P	P	HDW 4	X
	FRCS-190										
	FRCS-191										
	FRCS-194					1/1				HDW 5	X



APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - AFT HARDWARE

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
03-2A-201010-1	ARCS-199	1/1									
03-2A-201013-1	ARCS-204	1/1									
	ARCS-206	1/1									
03-2A-201020-1	ARCS-203	2/1R	P	P	P						
03-2A-201020-2	ARCS-202	3/1R	P	P	P	3/1R	P	F	P	HDW 1	X
03-2A-201030-1	ARCS-10022X	3/1R	P	F	P						
	ARCS-210	3/1R	P	F	P						
03-2A-201030-2	ARCS-211	2/1R	P	P	F	2/1R	P	F	F	HDW 2	X
	ARCS-212	2/1R	P	P	F	2/1R	P	F	F	HDW 2	X
03-2A-201050-1	ARCS-245	3/3									
	ARCS-246	3/3									
03-2A-201060-1	ARCS-10027X	1/1				1/1				HDW 5	X
03-2A-201060-2	ARCS-10025X	2/1R	P	NA	P						
03-2A-201060-3	ARCS-242	3/1R	F	NA	P						
03-2A-201060-4	ARCS-242A	3/1R	P	NA	P						
03-2A-201060-5	ARCS-241A	2/1R	P	F	P						
03-2A-201070-1	ARCS-200	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
03-2A-201070-2	ARCS-201	3/3				3/3				HDW 4	X
03-2A-201080-1	ARCS-254	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	ARCS-256	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	ARCS-268	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	ARCS-272	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	ARCS-276	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	ARCS-280	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	ARCS-284	2/1R	F	F	P	2/1R	F	F	P	HDW 4	X
	ARCS-255	3/3				3/3				HDW 4	X
	ARCS-257	3/3				3/3				HDW 4	X
	ARCS-269	3/3				3/3				HDW 4	X
03-2A-201080-3	ARCS-273	3/3				3/3				HDW 4	X
	ARCS-277	3/3				3/3				HDW 4	X
	ARCS-281	3/3				3/3				HDW 4	X
	ARCS-285	3/3				3/3				HDW 4	X
	ARCS-229	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	ARCS-233	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
03-2A-201090-1	ARCS-235	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	ARCS-230	3/3				3/3				HDW 4	X
	ARCS-234	3/3				3/3				HDW 4	X
03-2A-201090-2	ARCS-236	3/3				3/3				HDW 4	X
	ARCS-208	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	ARCS-216	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
03-2A-201091-1	ARCS-220	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	ARCS-243	3/1R	F	F	P	3/1R	F	F	P	HDW 4	X
	ARCS-209	3/3				3/3				HDW 4	X
03-2A-201091-2	ARCS-217	3/3				3/3			HDW 4	X	

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
03-2A-201091-2	ARCS-221	3/3				3/3				HDW 4	X
	ARCS-244	3/3				3/3				HDW 4	X
03-2A-201095-1	ARCS-218	3/3				2/1R	P	F	P	HDW 1	X
03-2A-201095-2	ARCS-219	2/1R	P	F	F						
03-2A-201095-3	ARCS-10023X	1/1								HDW 8	
03-2A-202108-1	ARCS-223	1/1									
	ARCS-265	1/1									
03-2A-202110-1	ARCS-251	3/1R	P	P	P	3/1R	P	P	P	HDW 1, 7	X
	ARCS-253	3/1R	P	P	P						
03-2A-202110-2	ARCS-10029X	3/3				2/1R	P	NA	P	HDW 1	X
	ARCS-10030X	3/3				3/1R	P	NA	P	HDW 2	X
03-2A-202110-3	ARCS-250	2/2									
	ARCS-252	2/2									
03-2A-202111-1	ARCS-260	3/1R	P	P	P						
	ARCS-262	3/1R	P	P	P						
03-2A-202111-2	ARCS-261	2/2	P	P	P						
	ARCS-263	2/2	P	P	P						
03-2A-202111-3	ARCS-10033X	3/3				3/1R	P	NA	P	HDW 2	X
03-2A-202112-1	ARCS-248	1/1				1/1				HDW 5	X
	ARCS-259	1/1				1/1				HDW 5	X
	ARCS-286	1/1				1/1				HDW 5	X
03-2A-202120-1	ARCS-266	3/1R	P	NA	P						
	ARCS-270	3/1R	P	NA	P						
	ARCS-274	3/1R	P	NA	P						
	ARCS-278	3/1R	P	NA	P						
03-2A-202120-2	ARCS-10035X	3/3				2/1R	P	NA	P	HDW 1	X
03-2A-202120-3	ARCS-267	3/1R	P	P	P	3/1R	P	P	P	HDW 1, 7	X
	ARCS-271	3/1R	P	P	P	3/1R	P	P	P	HDW 1, 7	X
	ARCS-275	3/1R	P	P	P	3/1R	P	P	P	HDW 1, 7	X
	ARCS-279	3/1R	P	P	P	3/1R	P	P	P	HDW 1, 7	X
03-2A-202140-1	ARCS-283	2/2									
03-2A-202140-2	ARCS-282	3/1R	P	NA	P						
03-2A-202140-3	ARCS-10036X	1/1									
	ARCS-286A	1/1				1/1				HDW 5	X
03-2A-202150-1	ARCS-225	2/1R	F	F	P						
	ARCS-231	2/1R	F	F	P						
	ARCS-237	2/1R	F	F	P						
03-2A-202150-2	ARCS-226	3/3				3/3				HDW 4	X
	ARCS-232	3/3				3/3				HDW 4	X
	ARCS-238	3/3				3/3				HDW 4	X
03-2A-211110-1	ARCS-222	1/1									
03-2A-211110-2	ARCS-227	1/1								HDW 6	X
03-2A-211120-1	ARCS-239	1/1									
03-2A-221308-1	ARCS-288	1/1									
03-2A-221310-1	ARCS-290	3/1R	F	P	P	1/1				HDW 2	X
	ARCS-294	3/1R	F	P	P	1/1				HDW 2	X
	ARCS-296	3/1R	F	P	P	1/1				HDW 2	X
	ARCS-298	3/1R	F	P	P	1/1				HDW 2	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE			
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)		
03-2A-221310-3	ARCS-10138X	3/3				1/1				HDW 1	X	
03-2A-221310-4	ARCS-293	3/1R	F	P	P	3/1R	F	P	P	HDW 2, 7	X	
	ARCS-295	3/1R	F	P	P	3/1R	F	P	P	HDW 2, 7	X	
	ARCS-297	3/1R	F	P	P	3/1R	F	P	P	HDW 2, 7	X	
03-2A-221312-1	ARCS-306	1/1										
03-2A-221313-1	ARCS-306A	1/1										
03-2A-231310-1	ARCS-302	2/2										
	ARCS-305	2/2										
03-2A-231310-2	ARCS-307	1/1										
03-2A-231310-3	ARCS-301	3/1R	F	P	P	1/1				HDW 2	X	
	ARCS-304	3/1R	F	P	P	1/1				HDW 2	X	
NONE	ARCS-10020X					2/1R	P	F	F	HDW 4	X	
	ARCS-10021X					1/1				HDW 5	X	
	ARCS-10024X					1/1				HDW 5	X	
	ARCS-10026X					3/1R	F	NA	P	HDW 4	X	
	ARCS-10028X					3/1R	P	F	P	HDW 4	X	
	ARCS-10031X											
	ARCS-10032X											
	ARCS-10034X											
	ARCS-10037X											
	ARCS-10038X											
	ARCS-10039X											
	ARCS-10040X						1/1				HDW 5	X
	ARCS-10041X						1/1				HDW 5	X
	ARCS-10043X						1/1				HDW 4	X
	ARCS-202A						3/1R	P	F	P	HDW 4	X
	ARCS-205											
	ARCS-207											
	ARCS-213						1/1				HDW 5	X
	ARCS-214						3/2R	P	F	P	HDW 4	X
	ARCS-215											
	ARCS-224											
	ARCS-228											
	ARCS-240											
	ARCS-241						2/1R	P	F	P	HDW 4	X
	ARCS-247						1/1				HDW 5	X
	ARCS-249						3/1R	P	P	P	HDW 4, 7	X
	ARCS-258						2/2				HDW 4, 7	X
	ARCS-264											
	ARCS-287						2/2				HDW 4, 7	X
	ARCS-289											
	ARCS-291						1/1				HDW 5	X
	ARCS-292						3/1R	F	P	P	HDW 4, 7	X
	ARCS-299											
ARCS-300												
ARCS-303						1/1				HDW 5	X	

APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - FORWARD EPD&C

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
03-2F-103340-2	FRCS-1197	3/2R	P	P	P						
	FRCS-1198	3/2R	P	P	P						
	FRCS-1199	3/2R	P	P	P						
	FRCS-1200	3/2R	P	P	P						
	FRCS-1201	3/2R	P	P	P						
	FRCS-1202	3/2R	P	P	P						
	FRCS-1203	3/2R	P	P	P						
	FRCS-1204	3/2R	P	P	P						
	FRCS-1205	3/2R	P	P	P						
	FRCS-1206	3/2R	P	P	P						
	FRCS-1207	3/2R	P	P	P						
	FRCS-1208	3/2R	P	P	P						
03-2F-103345-1	FRCS-1290	3/2R	P	P	P						
	FRCS-1291	3/2R	P	P	P						
	FRCS-1292	3/2R	P	P	P						
	FRCS-1296	3/2R	P	P	P						
03-2F-103345-2	FRCS-1298	3/2R	P	P	P						
	FRCS-1293	3/2R	P	P	P						
	FRCS-1295	3/2R	P	P	P						
	FRCS-1297	3/2R	P	P	P						
03-2F-103345-2	FRCS-1299	3/2R	P	P	P						
	FRCS-1300	3/2R	P	P	P	2/2			EPD&C 6		X
03-2F-103350-1	FRCS-373	3/2R	P	P	P						
	FRCS-374	3/2R	P	P	P						
	FRCS-375	3/2R	P	P	P						
	FRCS-376	3/2R	P	P	P						
	FRCS-377	3/2R	P	P	P						
	FRCS-378	3/2R	P	P	P						
	FRCS-379	3/2R	P	P	P						
	FRCS-380	3/2R	P	P	P						
03-2F-103350-2	FRCS-841	3/2R	P	P	P						
	FRCS-842	3/2R	P	P	P						
	FRCS-843	3/2R	P	P	P						
	FRCS-844	3/2R	P	P	P						
	FRCS-845	3/2R	P	P	P						
	FRCS-846	3/2R	P	P	P						
	FRCS-847	3/2R	P	P	P						
	FRCS-848	3/2R	P	P	P						
03-2F-103350-3	FRCS-863	3/2R	P	P	P						
	FRCS-864	3/2R	P	P	P						
	FRCS-865	3/2R	P	P	P						
	FRCS-866	3/2R	P	P	P						
	FRCS-867	3/2R	P	P	P						
	FRCS-868	3/2R	P	P	P						

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE	
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)
03-2F-103350-3	FRCS-869	3/2R	P	P	P					
	FRCS-870	3/2R	P	P	P					
	FRCS-871	3/2R	P	P	P					
	FRCS-872	3/2R	P	P	P					
	FRCS-873	3/2R	P	P	P					
	FRCS-874	3/2R	P	P	P					
	FRCS-875	3/2R	P	P	P					
	FRCS-876	3/2R	P	P	P					
	FRCS-877	3/2R	P	P	P					
03-2F-103360-1	FRCS-878	3/2R	P	P	P					
	FRCS-381	3/3								
	FRCS-382	3/3								
	FRCS-385	3/3								
03-2F-103370-1	FRCS-386	3/3								
	FRCS-849	3/2R	P	P	P					
	FRCS-850	3/2R	P	P	P					
	FRCS-851	3/2R	P	P	P					
	FRCS-852	3/2R	P	P	P					
	FRCS-853	3/2R	P	P	P					
	FRCS-854	3/2R	P	P	P					
	FRCS-855	3/2R	P	P	P					
	FRCS-856	3/2R	P	P	P					
	FRCS-857	3/2R	P	P	P					
	FRCS-858	3/2R	P	P	P					
	FRCS-859	3/2R	P	P	P					
	FRCS-860	3/2R	P	P	P					
	FRCS-861	3/2R	P	P	P					
	FRCS-862	3/2R	P	P	P					
03-2F-121314-1	FRCS-1137	3/1R	P	P	P					
	FRCS-1139	3/1R	P	P	P					
	FRCS-1141	3/1R	P	P	P					
	FRCS-1143	3/1R	P	P	P					
03-2F-121314-2	FRCS-1136	3/1R	P	P	P					
	FRCS-1138	3/1R	P	P	P					
	FRCS-1140	3/1R	P	P	P					
	FRCS-1142	3/1R	P	P	P					
03-2F-121315-1	FRCS-1147	3/1R	P	P	P					
	FRCS-1149	3/1R	P	P	P					
	FRCS-1151	3/1R	P	P	P					
03-2F-121315-2	FRCS-1153	3/1R	P	P	P					
	FRCS-1146	3/1R	P	P	P					
	FRCS-1148	3/1R	P	P	P					
	FRCS-1150	3/1R	P	P	P					
03-2F-121316-1	FRCS-1152	3/1R	P	P	P					
	FRCS-1209	3/2R	P	P	P					
	FRCS-1211	3/2R	P	P	P					
03-2F-121316-2	FRCS-1213	3/2R	P	P	P					
	FRCS-1210	3/3								

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSU		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
03-2F-121316-2	FRCS-1212	3/3									
	FRCS-1214	3/3									
03-2F-121317-1	FRCS-1215	2/2									
03-2F-121317-2	FRCS-1216	3/3									
03-2F-121345-1	FRCS-1294	3/2R	P	P	P						
05-6KF-2001 -1	FRCS-340	3/1R	P	P	P						
	FRCS-341	3/1R	P	P	P						
05-6KF-2003 -1	FRCS-468	3/1R	P	P	P						
	FRCS-469	3/1R	P	P	P						
05-6KF-2004 -1	FRCS-470	3/1R	P	P	P						
	FRCS-471	3/1R	P	P	P						
05-6KF-2005 -1	FRCS-696	3/1R	P	P	P						
	FRCS-697	3/1R	P	P	P						
	FRCS-698	3/1R	P	P	P						
	FRCS-699	3/1R	P	P	P						
05-6KF-2006 -1	FRCS-11001X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
	FRCS-11002X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
05-6KF-2007 -1	FRCS-961	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-964	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-967	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-969	3/1R	P	P	P						
05-6KF-2008 -1	FRCS-960	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-963	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-966	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-970	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2009 -1	FRCS-959	3/2R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-962	3/2R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-965	3/2R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2010 -1	FRCS-1196	2/2									
05-6KF-2011 -1	FRCS-1192	3/2R	P	P	P						
	FRCS-1193	3/2R	P	P	P						
	FRCS-1194	3/2R	P	P	P						
05-6KF-2011A-1	FRCS-1195	3/2R	P	P	P						
05-6KF-2012 -1	FRCS-1188	3/2R	P	P	P						
	FRCS-1189	3/2R	P	P	P						
	FRCS-1190	3/2R	P	P	P						
	FRCS-1191	3/2R	P	P	P						
05-6KF-2013 -1	FRCS-1180	3/2R	P	P	P						
	FRCS-1181	3/2R	P	P	P						
	FRCS-1182	3/2R	P	P	P						
	FRCS-1183	3/2R	P	P	P						
	FRCS-1184	3/2R	P	P	P						
	FRCS-1185	3/2R	P	P	P						
	FRCS-1186	3/2R	P	P	P						
	FRCS-1187	3/2R	P	P	P						
05-6KF-2017 -1	FRCS-968	2/2									
	FRCS-971	2/2									
05-6KF-2026 -1	FRCS-11080X	3/1R	P	P	P						

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2026 -1	FRCS-11084X	3/1R	P	P	P						
05-6KF-2026 -2	FRCS-11081X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11082X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11083X	3/1R	P	P	P	3/3				EPD&C 6	X
05-6KF-2028 -1	FRCS-11085X	3/1R	P	P	P						
	FRCS-11089X	3/1R	P	P	P						
05-6KF-2028 -2	FRCS-11086X	3/1R	P	P	P						
	FRCS-11087X	3/1R	P	P	P						
	FRCS-11088X	3/1R	P	P	P						
05-6KF-2029 -1	FRCS-11090X	3/1R	P	P	P						
	FRCS-11094X	3/1R	P	P	P						
05-6KF-2029 -2	FRCS-11091X	3/1R	P	P	P						
	FRCS-11092X	3/1R	P	P	P						
	FRCS-11093X	3/1R	P	P	P						
05-6KF-2030 -1	FRCS-11095X	3/1R	P	P	P						
	FRCS-11099X	3/1R	P	P	P						
	FRCS-11100X	3/1R	P	P	P						
	FRCS-11104X	3/1R	P	P	P						
	FRCS-11105X	3/1R	P	P	P						
	FRCS-11109X	3/1R	P	P	P						
	FRCS-11110X	3/1R	P	P	P						
	FRCS-11114X	3/1R	P	P	P						
05-6KF-2030 -2	FRCS-11096X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11097X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11098X	3/1R	P	P	P	3/3				EPD&C 6	X
	FRCS-11101X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11102X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11103X	3/1R	P	P	P	3/3				EPD&C 6	X
	FRCS-11106X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11107X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11108X	3/1R	P	P	P	3/3				EPD&C 6	X
	FRCS-11111X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11112X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11113X	3/1R	P	P	P	3/3				EPD&C 6	X
05-6KF-2032 -1	FRCS-11003X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
	FRCS-11004X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
	FRCS-11006X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
05-6KF-2032 -2	FRCS-11005X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3,4	X
	FRCS-11007X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3,4	X
05-6KF-2033 -1	FRCS-11190X	3/3									
05-6KF-2034 -1	FRCS-11191X	3/3				3/2R	P	P	P	EPD&C 6	X
05-6KF-2035 -1	FRCS-11115X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11119X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11125X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11129X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11135X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11139X	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-11145X	3/1R	P	P	P	3/1R	P	P	P		

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C	CRIT HW/F	SCREENS A B C	OTHER (SEE LEGEND CODE)		
05-6KF-2035 -1	FRCS-11149X	3/1R	P P P	3/1R	P P P			
05-6KF-2035 -2	FRCS-11116X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11117X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11118X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11126X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11127X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11128X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11136X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11137X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11138X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11146X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11147X	3/1R	P P P	3/3		EPD&C 6	X	
	FRCS-11148X	3/1R	P P P	3/3		EPD&C 6	X	
05-6KF-2036 -1	FRCS-11120X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
	FRCS-11124X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
	FRCS-11130X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
	FRCS-11134X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
	FRCS-11140X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
	FRCS-11144X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
	FRCS-11150X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
	FRCS-11154X	3/1R	P P P	2/1R	P P P	EPD&C 4	X	
05-6KF-2036 -2	FRCS-11121X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11122X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11123X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11131X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11132X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11133X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11141X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11142X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11143X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11151X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11152X	3/1R	P P P	3/3		EPD&C 2	X	
	FRCS-11153X	3/1R	P P P	3/3		EPD&C 2	X	
05-6KF-2037 -1	FRCS-11160X	3/2R	P P P					
	FRCS-11162X	3/2R	P P P					
	FRCS-11164X	3/2R	P P P					
	FRCS-11165X	3/2R	P P P					
	FRCS-11167X	3/2R	P P P					
	FRCS-11169X	3/2R	P P P					
	FRCS-11170X	3/2R	P P P					
	FRCS-11172X	3/2R	P P P					
	FRCS-11174X	3/2R	P P P					
	FRCS-11175X	3/2R	P P P					
	FRCS-11177X	3/2R	P P P					
	FRCS-11179X	3/2R	P P P					
05-6KF-2037 -2	FRCS-11161X	3/3						
	FRCS-11163X	3/3						
	FRCS-11166X	3/3						



IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE	
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C		OTHER (SEE LEGEND CODE)
05-6KF-2037 -2	FRCS-11168X	3/3							
	FRCS-11171X	3/3							
	FRCS-11173X	3/3							
	FRCS-11176X	3/3							
	FRCS-11178X	3/3							
05-6KF-2038 -1	FRCS-11185X	2/2							
	FRCS-11187X	2/2							
	FRCS-11189X	2/2							
05-6KF-2038 -2	FRCS-11186X	3/3							
	FRCS-11188X	3/3							
05-6KF-2041 -1	FRCS-11155X	2/2							
	FRCS-11159X	2/2							
05-6KF-2041 -2	FRCS-11156X	3/2R	P	P	P	3/3		EPD&C 2	X
	FRCS-11157X	3/2R	P	P	P	3/3		EPD&C 2	X
	FRCS-11158X	3/2R	P	P	P	3/3		EPD&C 2	X
05-6KF-2042 -1	FRCS-11180X	2/2							
	FRCS-11182X	2/2							
	FRCS-11184X	2/2							
05-6KF-2042 -2	FRCS-11181X	3/3							
	FRCS-11183X	3/3							
05-6KF-2076 -1	FRCS-342	3/3							
	FRCS-343	3/3							
	FRCS-344	3/3							
	FRCS-345	3/3							
	FRCS-346	3/3							
	FRCS-347	3/3							
05-6KF-2077 -1	FRCS-348	3/3				3/2R	P P P	EPD&C 1	X
	FRCS-349	3/3							
	FRCS-350	3/3				3/2R	P P P	EPD&C 1	X
	FRCS-351	3/3							
	FRCS-352	3/3				3/2R	P P P	EPD&C 1	X
	FRCS-353	3/3							
	FRCS-354	3/3				3/2R	P P P	EPD&C 1	X
05-6KF-2078 -1	FRCS-355	3/3							
	FRCS-356	3/3				3/2R	P P P	EPD&C 1	X
05-6KF-2081 -1	FRCS-357	3/3							
	FRCS-502	3/3				3/2R	P P P	EPD&C 1	X
05-6KF-2082 -1	FRCS-503	3/3							
	FRCS-506	3/3				3/2R	P P P	EPD&C 1	X
	FRCS-510	3/3				3/2R	P P P	EPD&C 1	X
	FRCS-511	3/3							
	FRCS-512	3/3				3/2R	P P P	EPD&C 1	X
	FRCS-513	3/3							
	FRCS-504	3/3				3/2R	P P P	EPD&C 1	X
	FRCS-505	3/3							
	FRCS-507	3/3							
	FRCS-508	3/3				3/2R	P P P	EPD&C 1	X
FRCS-509	3/3								

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2083 -1	FRCS-496	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-498	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-500	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2083 -2	FRCS-497	3/3									
	FRCS-499	3/3									
	FRCS-501	3/3									
05-6KF-2084 -1	FRCS-514	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-516	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-518	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2084 -2	FRCS-515	3/3									
	FRCS-517	3/3				3/2R	P	P	P		
	FRCS-519	3/3									
05-6KF-2085 -1	FRCS-522	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-523	3/3									
	FRCS-526	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2086 -1	FRCS-527	3/3									
	FRCS-520	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-521	3/3									
05-6KF-2086 -1	FRCS-524	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-525	3/3									
	FRCS-528	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2086 -1	FRCS-529	3/3									
	FRCS-530	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-531	3/3									
05-6KF-2087 -1	FRCS-720	3/3									
	FRCS-721	3/3									
	FRCS-722	3/3									
	FRCS-723	3/3									
	FRCS-734	3/3									
	FRCS-735	3/3									
	FRCS-736	3/3									
	FRCS-737	3/3									
	FRCS-748	3/3									
	FRCS-749	3/3									
	FRCS-750	3/3									
	FRCS-751	3/3									
	FRCS-762	3/3									
	FRCS-763	3/3									
	FRCS-764	3/3									
05-6KF-2088 -1	FRCS-724	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-725	3/3									
	FRCS-726	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-727	3/3									
	FRCS-728	3/3									
	FRCS-729	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-730	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-731	3/3									
	FRCS-738	3/3				3/2R	P	P	P	EPD&C 1	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2088 -1	FRCS-739	3/3									
	FRCS-740	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-741	3/3									
	FRCS-742	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-743	3/3									
	FRCS-744	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-745	3/3									
	FRCS-752	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-753	3/3									
	FRCS-754	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-755	3/3									
	FRCS-756	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-757	3/3									
	FRCS-758	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-759	3/3									
FRCS-766	3/3				3/2R	P	P	P	EPD&C 1	X	
FRCS-768	3/3				3/2R	P	P	P	EPD&C 1	X	
FRCS-770	3/3				3/2R	P	P	P	EPD&C 1	X	
FRCS-772	3/3				3/2R	P	P	P	EPD&C 1	X	
05-6KF-2089 -1	FRCS-718	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-732	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-746	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-760	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2089 -2	FRCS-719	3/3									
	FRCS-733	3/3									
	FRCS-747	3/3									
	FRCS-761	3/3									
05-6KF-2090 -1	FRCS-11008X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2090 -2	FRCS-11009X	3/3									
05-6KF-2091 -1	FRCS-11012X	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-11013X	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-11014X	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-11015X	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-765	3/3									
	FRCS-767	3/3									
	FRCS-769	3/3									
	FRCS-771	3/3									
	FRCS-773	3/3									
	05-6KF-2092 -1	FRCS-11010X	3/3								
FRCS-11011X		3/3									
05-6KF-2093 -1	FRCS-1012	3/3									
	FRCS-1013	3/3									
	FRCS-1044	3/3									
	FRCS-1045	3/3									
	FRCS-980	3/3									
	FRCS-981	3/3									
	FRCS-996	3/3									
	FRCS-997	3/3									

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE	
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C		OTHER (SEE LEGEND CODE)
05-6KF-2094 -1	FRCS-1000	3/1R	P	F	P				
	FRCS-1016	3/1R	P	F	P				
	FRCS-1028	3/1R	P	F	P				
	FRCS-1036	3/1R	P	F	P				
	FRCS-988	3/1R	P	F	P				
05-6KF-2094 -2	FRCS-1001	3/3							
	FRCS-1017	3/3							
	FRCS-1029	3/3							
	FRCS-1037	3/3							
	FRCS-989	3/3							
05-6KF-2095 -1	FRCS-1010	3/3							
	FRCS-1011	3/3							
	FRCS-978	3/3							
	FRCS-979	3/3							
	FRCS-994	3/3							
	FRCS-995	3/3							
05-6KF-2096 -1	FRCS-1002	3/3							
	FRCS-1003	3/3							
	FRCS-1024	3/3							
	FRCS-1025	3/3							
	FRCS-1030	3/3							
	FRCS-1031	3/3							
	FRCS-1038	3/3							
	FRCS-1039	3/3							
	FRCS-990	3/3							
	FRCS-991	3/3							
	05-6KF-2097 -1	FRCS-1006	3/3						
		FRCS-1007	3/3						
		FRCS-1008	3/3						
FRCS-1009		3/3							
FRCS-1020		3/3							
FRCS-1021		3/3							
FRCS-1022		3/3							
FRCS-1023		3/3							
FRCS-1040		3/3							
FRCS-1041		3/3							
FRCS-1042		3/3							
FRCS-1043		3/3							
FRCS-986		3/3							
FRCS-987		3/3							
05-6KF-2098 -1	FRCS-992	3/3							
	FRCS-993	3/3							
	FRCS-1004	3/3							
	FRCS-1005	3/3							
	FRCS-1014	3/3							
	FRCS-1015	3/3							
	FRCS-1018	3/3							
	FRCS-1019	3/3							

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2098 -1	FRCS-1026	3/3									
	FRCS-1027	3/3									
	FRCS-1032	3/3									
	FRCS-1033	3/3									
	FRCS-1046	3/3									
	FRCS-1047	3/3									
	FRCS-1048	3/3									
	FRCS-1049	3/3									
	FRCS-982	3/3									
	FRCS-983	3/3									
	FRCS-984	3/3									
	FRCS-985	3/3									
	FRCS-998	3/3									
FRCS-999	3/3										
05-6KF-2099 -1	FRCS-1237	3/3									
	FRCS-1238	3/3									
	FRCS-1239	3/3									
	FRCS-1240	3/3									
	FRCS-1241	3/3									
	FRCS-1242	3/3									
	FRCS-1243	3/3									
	FRCS-1244	3/3									
	FRCS-1245	3/3									
	FRCS-1246	3/3									
05-6KF-2100 -1	FRCS-1225	3/3									
	FRCS-1226	3/3									
	FRCS-1233	3/3									
05-6KF-2101 -1	FRCS-1221	3/2R	P	P	P						
	FRCS-1223	3/2R	P	P	P						
	FRCS-1231	3/2R	P	P	P						
	FRCS-1235	3/2R	P	P	P						
05-6KF-2101 -2	FRCS-1222	3/3									
	FRCS-1224	3/3									
	FRCS-1232	3/3									
	FRCS-1236	3/3									
05-6KF-2109 -1	FRCS-1050	3/3									
	FRCS-1051	3/3									
	FRCS-1054	3/3									
	FRCS-1055	3/3									
05-6KF-2110 -1	FRCS-1052	3/3									
	FRCS-1053	3/3									
	FRCS-1056	3/3									
	FRCS-1057	3/3									
05-6KF-2111 -1	FRCS-1034	3/2R	P	F	P						
05-6KF-2113A-1	FRCS-11032X	3/2R	P	P	P	2/2			EPD&C 4	X	
05-6KF-2113A-2	FRCS-11033X	3/1R	P	F	P	3/3			EPD&C 2,4	X	
05-6KF-2126 -1	FRCS-472	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2126 -1	FRCS-478	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2126 -2	FRCS-473	2/1R	P	F	P	3/1R	P	P	P	EPD&C 3	X
	FRCS-479	2/1R	P	F	P	3/1R	P	P	P	EPD&C 3	X
05-6KF-2126A-1	FRCS-474	3/1R	P	P	P						
	FRCS-476	3/1R	P	P	P						
	FRCS-480	3/1R	P	P	P						
	FRCS-482	3/1R	P	P	P						
05-6KF-2126A-2	FRCS-475	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-477	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
	FRCS-481	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-483	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
05-6KF-2127 -1	FRCS-486	3/1R	P	P	P						
	FRCS-488	3/1R	P	P	P						
	FRCS-492	3/1R	P	P	P						
	FRCS-494	3/1R	P	P	P						
05-6KF-2127 -2	FRCS-487	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-489	2/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
	FRCS-493	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-495	2/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
05-6KF-2127A-1	FRCS-484	3/1R	P	P	P	2/1R	P	F	P	EPD&C 4	X
05-6KF-2127A-2	FRCS-490	3/1R	P	P	P	2/1R	P	F	P	EPD&C 4	X
	FRCS-485	2/1R	P	F	P	3/1R	P	P	P	EPD&C 3	X
	FRCS-491	2/1R	P	F	P	3/1R	P	P	P	EPD&C 3	X
05-6KF-2128 -1	FRCS-704	3/1R	P	NA	P						
	FRCS-708	3/1R	P	NA	P						
	FRCS-712	3/1R	P	NA	P						
	FRCS-716	3/1R	P	NA	P						
05-6KF-2128 -2	FRCS-705	2/1R	P	F	P	2/1R	P	P	P	EPD&C 2,4	X
	FRCS-709	2/1R	P	F	P	2/1R	P	P	P	EPD&C 2,4	X
	FRCS-713	2/1R	P	F	P	2/1R	P	P	P	EPD&C 2,4	X
	FRCS-717	2/1R	P	F	P	2/1R	P	P	P	EPD&C 2,4	X
05-6KF-2128A-1	FRCS-702	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-706	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-710	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-714	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2128A-2	FRCS-703	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	FRCS-707	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	FRCS-711	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	FRCS-715	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
05-6KF-2130 -1	FRCS-972	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-974	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-976	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2130 -2	FRCS-973	3/1R	P	P	P	3/3				EPD&C 2	X
	FRCS-975	3/1R	P	P	P	3/3				EPD&C 2	X
	FRCS-977	3/1R	P	P	P	3/3				EPD&C 2	X
05-6KF-2131 -1	FRCS-1217	3/2R	P	P	P						
	FRCS-1219	3/2R	P	P	P						
05-6KF-2131 -2	FRCS-1218	3/3									

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2131 -2	FRCS-1220	3/3									
05-6KF-2151 -1	FRCS-387	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2153 -1	FRCS-879	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2154 -1	FRCS-879A	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2155 -1	FRCS-880	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-881	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-882	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-883	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2155 -2	FRCS-880A	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-881A	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-882A	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-883A	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2156 -1	FRCS-11017X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2156 -2	FRCS-11016X	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2157 -1	FRCS-11192X	3/3									
05-6KF-2158 -1	FRCS-11193X	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-11194X	3/3				3/2R	P	P	P	EPD&C 6	X
05-6KF-2176 -1	FRCS-308	3/1R	P	P	P						
	FRCS-312	3/1R	P	P	P						
05-6KF-2176 -2	FRCS-309	3/1R	P	P	P						
	FRCS-313	3/1R	P	P	P						
05-6KF-2176A-1	FRCS-310	3/1R	P	P	P						
	FRCS-314	3/1R	P	P	P						
05-6KF-2176A-2	FRCS-311	3/3									
	FRCS-315	3/3									
05-6KF-2177 -1	FRCS-11018X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
05-6KF-2177 -2	FRCS-11019X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2178 -1	FRCS-11020X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KF-2178 -2	FRCS-11021X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2179 -1	FRCS-885	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-889	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-893	3/1R	P	P	P						
	FRCS-904	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2179 -2	FRCS-886	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-890	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-894	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-901	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2180 -1	FRCS-887	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-891	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-895	3/1R	P	P	P						
	FRCS-902	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2180 -2	FRCS-888	3/3									
	FRCS-892	3/3									
	FRCS-896	3/3									
	FRCS-903	3/3									
05-6KF-2181 -1	FRCS-897	3/1R	P	P	P						
05-6KF-2181 -2	FRCS-898	3/3									
05-6KF-2182 -1	FRCS-899	3/1R	P	P	P						

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2182 -2	FRCS-900	3/1R	P	P	P	3/3				EPD&C 2	X
05-6KF-2183 -1	FRCS-905	2/2									
	FRCS-907	2/2									
05-6KF-2183 -2	FRCS-906	3/2R	P	F	P	3/3				EPD&C 2	X
	FRCS-908	3/2R	P	F	P	3/3				EPD&C 2	X
05-6KF-2201 -1	FRCS-336	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2201 -2	FRCS-337	3/1R	P	P	P						
05-6KF-2201A-1	FRCS-334	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2201A-2	FRCS-335	3/1R	P	P	P						
05-6KF-2202 -1	FRCS-330	3/1R	P	P	P						
	FRCS-332	3/1R	P	P	P						
05-6KF-2202 -2	FRCS-331	3/1R	P	P	P						
	FRCS-333	3/1R	P	P	P						
05-6KF-2202A-1	FRCS-328	3/1R	P	P	P						
	FRCS-338	3/1R	P	P	P						
05-6KF-2202A-2	FRCS-329	3/3									
	FRCS-339	3/3									
05-6KF-2206 -1	FRCS-460	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-462	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2206 -2	FRCS-461	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-463	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2207 -1	FRCS-464	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-466	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2207 -2	FRCS-465	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-467	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2208 -1	FRCS-668	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-670	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-672	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-674	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-676	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-678	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-680	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	FRCS-682	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2208 -2	FRCS-669	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-671	3/1R	P	P	P						
	FRCS-673	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-675	3/1R	P	P	P						
	FRCS-677	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-679	3/1R	P	P	P						
	FRCS-681	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-683	3/1R	P	P	P						
05-6KF-2210 -1	FRCS-11024X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2210 -2	FRCS-11025X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KF-2210A-1	FRCS-11022X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KF-2210A-2	FRCS-11023X	3/2R	P	P	P	3/1R	P	P	P	EPD&C 4	X
05-6KF-2211 -1	FRCS-11030X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KF-2211 -2	FRCS-11031X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2212 -1	FRCS-11028X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X



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NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2212 -2	FRCS-11029X	3/1R	P	F	P	3/1R	P	NA	P	EPD&C 3,4	X
05-6KF-2213 -1	FRCS-11026X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
05-6KF-2213 -2	FRCS-11027X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2214 -1	FRCS-947	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-949	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-951	3/1R	P	P	P						
	FRCS-953	3/1R	P	P	P						
	FRCS-956	3/1R	P	P	P	2/1R	P	P	P	EPD&C 4	X
05-6KF-2214 -2	FRCS-948	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-950	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-952	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-954	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-955	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2215 -1	FRCS-1156	3/2R	P	P	P						
	FRCS-1158	3/2R	P	P	P						
	FRCS-1160	3/2R	P	P	P						
	FRCS-1162	3/2R	P	P	P						
	FRCS-1164	3/2R	P	P	P						
	FRCS-1166	3/2R	P	P	P						
	FRCS-1168	3/2R	P	P	P						
	FRCS-1170	3/2R	P	P	P						
	FRCS-1172	3/2R	P	P	P						
	FRCS-1174	3/2R	P	P	P						
	FRCS-1176	3/2R	P	P	P						
05-6KF-2215 -2	FRCS-1178	3/2R	P	P	P						
	FRCS-1157	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1159	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1161	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1163	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1165	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1167	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1169	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1171	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1173	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1175	3/3				3/2R	P	P	P	EPD&C 6	X
05-6KF-2220 -1	FRCS-1177	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-1179	3/3				3/2R	P	P	P	EPD&C 6	X
	FRCS-957	2/2									
	FRCS-958	3/2R	P	F	P	3/3				EPD&C 2	X
	FRCS-11034X	3/2R	P	P	P	2/2				EPD&C 4	X
	FRCS-11035X	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-316	3/1R	P	NA	P						
	FRCS-318	3/1R	P	NA	P						
05-6KF-2251 -2	FRCS-317	3/3									
	FRCS-319	3/3									
05-6KF-2252 -1	FRCS-320	3/1R	P	P	P						
	FRCS-322	3/1R	P	P	P						
05-6KF-2252 -2	FRCS-321	3/1R	P	F	P	3/3				EPD&C 2	X

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NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2252 -2	FRCS-323	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2252 -3	FRCS-11211X	3/1R	P	F	P	3/1R	P	NA	P	EPD&C 3	X
	FRCS-11212X	3/1R	P	F	P	3/1R	P	NA	P	EPD&C 3	X
05-6KF-2253 -1	FRCS-388	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-406	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-410	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-420	2/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2253 -2	FRCS-389	3/3									
	FRCS-407	3/3									
	FRCS-411	3/3									
	FRCS-421	3/3									
05-6KF-2253A-1	FRCS-402	3/3									
	FRCS-404	3/3									
	FRCS-422	3/3									
05-6KF-2253A-2	FRCS-403	3/3									
	FRCS-405	3/3									
	FRCS-423	3/3									
05-6KF-2253B-1	FRCS-398	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
	FRCS-400	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
05-6KF-2253B-2	FRCS-399	3/3									
	FRCS-401	3/3									
05-6KF-2253C-1	FRCS-390	3/1R	P	P	P						
	FRCS-392	3/1R	P	P	P						
05-6KF-2253C-2	FRCS-391	3/3									
	FRCS-393	3/3									
05-6KF-2253D-1	FRCS-396	3/1R	P	P	P						
	FRCS-414	3/1R	P	P	P						
	FRCS-416	3/1R	P	P	P						
05-6KF-2253D-2	FRCS-397	3/3									
	FRCS-415	3/3									
	FRCS-417	3/3									
05-6KF-2253E-1	FRCS-408	3/1R	P	P	P	3/3				EPD&C 2	X
	FRCS-418	3/1R	P	P	P	3/3				EPD&C 2	X
05-6KF-2253E-2	FRCS-409	3/3									
	FRCS-419	3/3									
05-6KF-2253F-1	FRCS-394	3/3									
	FRCS-412	3/3									
05-6KF-2253F-2	FRCS-395	3/3									
	FRCS-413	3/3									
05-6KF-2254 -1	FRCS-424	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-442	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-446	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-456	2/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2254 -2	FRCS-425	3/3									
	FRCS-443	3/3									
	FRCS-447	3/3									
	FRCS-459	3/3									
05-6KF-2254A-1	FRCS-438	3/3									

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NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2254A-1	FRCS-440	3/3									
	FRCS-458	3/3									
05-6KF-2254A-2	FRCS-439	3/3									
	FRCS-441	3/3									
05-6KF-2254B-1	FRCS-457	3/3									
	FRCS-434	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
05-6KF-2254B-2	FRCS-436	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
	FRCS-435	3/3									
05-6KF-2254C-1	FRCS-437	3/3									
	FRCS-426	3/1R	P	P	P						
05-6KF-2254C-2	FRCS-428	3/1R	P	P	P						
	FRCS-427	3/3									
05-6KF-2254D-1	FRCS-429	3/3									
	FRCS-432	3/1R	P	P	P						
05-6KF-2254D-2	FRCS-450	3/1R	P	P	P						
	FRCS-452	3/1R	P	P	P						
05-6KF-2254E-1	FRCS-433	3/3									
	FRCS-451	3/3									
05-6KF-2254E-2	FRCS-453	3/3									
	FRCS-444	3/3									
05-6KF-2254F-1	FRCS-454	3/3									
	FRCS-445	3/3									
05-6KF-2254F-2	FRCS-455	3/3									
	FRCS-430	3/3									
05-6KF-2255 -1	FRCS-448	3/3									
	FRCS-431	3/3									
05-6KF-2255 -2	FRCS-449	3/3									
	FRCS-572	2/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2255A-1	FRCS-578	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-594	2/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2255A-2	FRCS-600	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-616	2/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2255A-1	FRCS-622	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-638	2/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2255A-1	FRCS-644	2/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-573	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2255A-1	FRCS-579	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-595	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2255A-1	FRCS-601	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-617	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2255A-1	FRCS-623	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-639	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2255A-1	FRCS-645	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-584	3/3									
05-6KF-2255A-1	FRCS-586	3/3									
	FRCS-606	3/3									
05-6KF-2255A-1	FRCS-608	3/3									
	FRCS-628	3/3									

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2255A-1	FRCS-630	3/3									
	FRCS-650	3/3									
	FRCS-652	3/3									
05-6KF-2255A-2	FRCS-585	3/3									
	FRCS-587	3/3									
	FRCS-607	3/3									
	FRCS-609	3/3									
	FRCS-629	3/3									
	FRCS-631	3/3									
	FRCS-651	3/3									
	FRCS-653	3/3									
05-6KF-2255B-1	FRCS-574	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
	FRCS-596	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
	FRCS-618	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
	FRCS-640	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 6	X
05-6KF-2255B-2	FRCS-575	3/3									
	FRCS-597	3/3									
	FRCS-619	3/3									
05-6KF-2255C-1	FRCS-641	3/3									
	FRCS-570	3/1R	P	P	P						
	FRCS-592	3/1R	P	P	P						
	FRCS-614	3/1R	P	P	P						
05-6KF-2255C-2	FRCS-636	3/1R	P	P	P						
	FRCS-571	3/3									
	FRCS-593	3/3									
	FRCS-615	3/3									
05-6KF-2255D-1	FRCS-637	3/3									
	FRCS-588	3/1R	P	P	P						
	FRCS-610	3/1R	P	P	P						
	FRCS-632	3/1R	P	P	P						
05-6KF-2255D-2	FRCS-654	3/1R	P	P	P						
	FRCS-589	3/3									
	FRCS-611	3/3									
	FRCS-633	3/3									
05-6KF-2255E-1	FRCS-655	3/3									
	FRCS-576	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-598	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-620	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2255E-2	FRCS-642	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-577	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
	FRCS-599	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
	FRCS-621	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
05-6KF-2255F-1	FRCS-643	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
	FRCS-568	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-590	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-612	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2255F-2	FRCS-634	3/1R	P	F	P	3/3				EPD&C 2	X
	FRCS-569	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2255F-2	FRCS-591	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
	FRCS-613	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
	FRCS-635	3/1R	P	F	P	2/1R	P	F	P	EPD&C 3,4	X
05-6KF-2257 -1	FRCS-11036X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2257 -2	FRCS-11037X	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2257A-1	FRCS-11038X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2257A-2	FRCS-11039X	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2257B-1	FRCS-11048X	3/2R	P	P	P						
	FRCS-11052X	3/2R	P	P	P						
05-6KF-2257B-2	FRCS-11049X	3/2R	P	P	P						
	FRCS-11053X	3/2R	P	P	P						
05-6KF-2257C-1	FRCS-11050X	3/2R	P	P	P						
	FRCS-11054X	3/2R	P	P	P						
05-6KF-2257C-2	FRCS-11051X	3/3									
	FRCS-11055X	3/3									
05-6KF-2257D-1	FRCS-11044X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
	FRCS-11060X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
05-6KF-2257D-2	FRCS-11045X	3/3									
	FRCS-11061X	3/3									
05-6KF-2257E-1	FRCS-11046X	3/3									
	FRCS-11062X	3/3									
05-6KF-2257E-2	FRCS-11047X	3/3									
	FRCS-11063X	3/3									
05-6KF-2257F-1	FRCS-11064X	3/2R	P	P	P	3/1R	P	NA	P	EPD&C 4	X
05-6KF-2257F-2	FRCS-11065X	3/2R	P	P	P	3/3				EPD&C 2	X
05-6KF-2257G-1	FRCS-11066X	3/3									
05-6KF-2257G-2	FRCS-11067X	3/3									
05-6KF-2257H-1	FRCS-11068X	3/2R	P	P	P						
05-6KF-2257H-2	FRCS-11069X	3/3									
05-6KF-2258 -1	FRCS-11070X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KF-2258 -2	FRCS-11071X	3/3									
05-6KF-2258 -3	FRCS-11221X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KF-2259 -1	FRCS-913	3/1R	P	F	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-919	3/1R	P	F	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-925	3/1R	P	F	P						
	FRCS-931	3/1R	P	F	P						
	FRCS-941	3/1R	P	F	P	2/1R	P	F	P	EPD&C 4	X
05-6KF-2259 -2	FRCS-914	3/3									
	FRCS-920	3/3									
	FRCS-926	3/3									
	FRCS-932	3/3									
	FRCS-942	3/3									
05-6KF-2259A-1	FRCS-911	3/1R	P	F	P						
	FRCS-917	3/1R	P	F	P						
	FRCS-923	3/1R	P	F	P						
	FRCS-929	3/1R	P	F	P						
	FRCS-939	3/1R	P	F	P						
05-6KF-2259A-2	FRCS-912	3/3									

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2259A-2	FRCS-918	3/3									
	FRCS-924	3/3									
	FRCS-930	3/3									
	FRCS-940	3/3									
05-6KF-2260 -1	FRCS-909	3/1R	P	F	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-915	3/1R	P	F	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-921	3/1R	P	F	P						
	FRCS-927	3/1R	P	F	P						
05-6KF-2260 -2	FRCS-943	3/1R	P	F	P	2/1R	P	P	P	EPD&C 4	X
	FRCS-910	3/3									
	FRCS-916	3/3									
	FRCS-922	3/3									
05-6KF-2266 -1	FRCS-928	3/3									
	FRCS-944	3/3									
	FRCS-11219X	3/1R	P	F	P						
	FRCS-11220X	3/1R	P	F	P						
05-6KF-2266 -2	FRCS-933	3/1R	P	F	P						
	FRCS-935	3/1R	P	F	P						
05-6KF-2267 -1	FRCS-934	3/3									
	FRCS-936	3/3									
05-6KF-2267 -2	FRCS-324	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-326	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2268 -1	FRCS-325	3/3									
	FRCS-327	3/3									
	FRCS-580	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-582	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-602	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-604	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-624	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-626	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2268 -2	FRCS-646	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-648	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-581	3/1R	P	P	P						
	FRCS-583	3/1R	P	P	P						
	FRCS-603	3/1R	P	P	P						
	FRCS-605	3/1R	P	P	P						
	FRCS-625	3/1R	P	P	P						
	FRCS-627	3/1R	P	P	P						
05-6KF-2269 -1	FRCS-647	3/1R	P	P	P						
	FRCS-649	3/1R	P	P	P						
05-6KF-2269 -2	FRCS-11056X	3/3				3/2R	P	P	P	EPD&C 1	X
	FRCS-11058X	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KF-2270 -1	FRCS-11057X	3/3									
05-6KF-2270 -2	FRCS-11059X	3/3									
	FRCS-11218X	2/2									
05-6KF-2271 -1	FRCS-945	2/2									
	FRCS-946	3/3									
	FRCS-937	3/1R	P	F	P						

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE			
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KF-2271 -2	FRCS-938	3/3									
05-6KF-2280 -1	FRCS-11076X	3/1R	P	P	P						
05-6KF-2280 -2	FRCS-11077X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KF-2302 -1	FRCS-11195X	2/2									
05-6KF-2303 -1	FRCS-11197X	3/1R	P	P	P						
NONE	FRCS-1035					3/3				EPD&C 5	X
	FRCS-11072X					3/1R	P	NA	P	EPD&C 5	X
	FRCS-11073X					3/3				EPD&C 5	X
	FRCS-11074X					3/1R	P	NA	P	EPD&C 5	X
	FRCS-11075X					3/3				EPD&C 5	X
	FRCS-11078X					3/2R	P	P	P	EPD&C 5	X
	FRCS-11079X					3/2R	P	P	P	EPD&C 5	X
	FRCS-11196X					3/2R	P	F	P	EPD&C 5	X
	FRCS-11198X										
	FRCS-11199X										
	FRCS-11200X										
	FRCS-11201X										
	FRCS-11202X					2/1R	P	F	P	EPD&C 5	X
	FRCS-11203X					3/3				EPD&C 5	X
	FRCS-11204X					3/2R	P	P	P	EPD&C 5	X
	FRCS-11205X					2/1R	P	P	P	EPD&C 5	X
	FRCS-11206X					2/1R	P	P	P	EPD&C 5	X
	FRCS-11207X					3/2R	P	P	P	EPD&C 5	X
	FRCS-11208X					3/2R	P	P	P	EPD&C 5	X
	FRCS-11209X					3/2R	P	P	P	EPD&C 5	X
	FRCS-11210X					3/2R	P	P	P	EPD&C 5	X
	FRCS-11213X					2/1R	P	F	P	EPD&C 4,5	X
	FRCS-11214X					2/1R	P	F	P	EPD&C 4,5	X
	FRCS-11215X					3/1R	P	F	P	EPD&C 4,5	X
	FRCS-11216X					3/1R	P	F	P	EPD&C 4,5	X
	FRCS-11217X					2/1R	P	F	P	EPD&C 4,5	X
	FRCS-1132										
	FRCS-1133										
	FRCS-1134										
	FRCS-1135										
	FRCS-1144					3/2R	P	F	P	EPD&C 5	X
	FRCS-1145					3/2R	P	F	P	EPD&C 5	X
	FRCS-1154					3/2R	P	F	P	EPD&C 5	X
	FRCS-1155					3/2R	P	F	P	EPD&C 5	X
	FRCS-1227										
	FRCS-1228										
	FRCS-1229										
	FRCS-1230										
	FRCS-1301					3/2R	P	P	P	EPD&C 5	X

APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - AFT EPD&C

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C	CRIT HW/F	SCREENS A B C	OTHER (SEE LEGEND CODE)		
03-2A-203350-1	ARCS-1414	3/2R	P P P					
	ARCS-1415	3/2R	P P P					
	ARCS-1416	3/2R	P P P					
	ARCS-1417	3/2R	P P P					
	ARCS-1418	3/2R	P P P					
	ARCS-1419	3/2R	P P P					
	ARCS-1420	3/2R	P P P					
	ARCS-1421	3/2R	P P P					
03-2A-203350-2	ARCS-1860	3/2R	P P P					
	ARCS-1861	3/2R	P P P					
	ARCS-1862	3/2R	P P P					
	ARCS-1863	3/2R	P P P					
	ARCS-1864	3/2R	P P P					
	ARCS-1865	3/2R	P P P					
	ARCS-1866	3/2R	P P P					
	ARCS-1867	3/2R	P P P					
03-2A-203350-3	ARCS-2268	3/2R	P P P					
	ARCS-2269	3/2R	P P P					
	ARCS-2270	3/2R	P P P					
	ARCS-2271	3/2R	P P P					
	ARCS-2272	3/2R	P P P					
	ARCS-2273	3/2R	P P P					
	ARCS-2274	3/2R	P P P					
	ARCS-2275	3/2R	P P P					
03-2A-203360-1	ARCS-1422	3/3						
	ARCS-1423	3/3						
	ARCS-1424	3/3						
	ARCS-1425	3/3						
03-2A-203365-1	ARCS-1868	3/2R	P P P					
	ARCS-1869	3/2R	P P P					
	ARCS-1870	3/2R	P P P					
	ARCS-1871	3/2R	P P P					
03-2A-203365-2	ARCS-2276	3/3						
	ARCS-2277	3/3						
	ARCS-2278	3/3						
	ARCS-2279	3/3						
03-2A-221314-1	ARCS-2280	3/1R	P P P					
	ARCS-2282	3/1R	P P P					
	ARCS-2283	3/1R	P P P					
	ARCS-2285	3/1R	P P P					
	ARCS-2289	3/1R	P P P					
	ARCS-2291	3/1R	P P P					
03-2A-221314-2	ARCS-2281	3/1R	P P P					
	ARCS-2284	3/1R	P P P					



IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE	
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)
03-2A-221214-2	ARCS-2290	3/1R	P	P	P					
03-2A-221315-1	ARCS-2292	3/1R	P	P	P					
	ARCS-2294	3/1R	P	P	P					
	ARCS-2298	3/1R	P	P	P					
03-2A-221315-2	ARCS-2293	3/1R	P	P	P					
	ARCS-2295	3/1R	P	P	P					
	ARCS-2299	3/1R	P	P	P					
03-2A-221316-1	ARCS-2316	3/2R	P	P	P					
	ARCS-2317	3/2R	P	P	P					
	ARCS-2318	3/2R	P	P	P					
03-2A-221316-2	ARCS-2319	3/3								
	ARCS-2320	3/3								
	ARCS-2321	3/3								
03-2A-221317-1	ARCS-2322	2/2								
03-2A-221317-2	ARCS-2323	3/3								
05-6KA-2001-1	ARCS-1362	3/1R	P	P	P					
	ARCS-1363	3/1R	P	P	P					
	ARCS-1364	3/1R	P	P	P					
	ARCS-1365	3/1R	P	P	P					
05-6KA-2003-1	ARCS-1524	3/1R	P	P	P					
	ARCS-1525	3/1R	P	P	P					
05-6KA-2004-1	ARCS-1526	3/1R	P	P	P					
	ARCS-1527	3/1R	P	P	P					
05-6KA-2005-1	ARCS-1535	3/1R	P	P	P					
	ARCS-1536	3/1R	P	P	P					
	ARCS-1537	3/1R	P	P	P					
	ARCS-1538	3/1R	P	P	P					
05-6KA-2006-1	ARCS-12001X	3/1R	P	P	P					
	ARCS-12002X	3/1R	P	P	P					
05-6KA-2007-1	ARCS-2008	3/1R	P	F	P					
	ARCS-2009	3/1R	P	F	P					
	ARCS-2011	3/1R	P	F	P					
	ARCS-2013	3/1R	P	F	P					
	ARCS-2017	3/1R	P	F	P					
	ARCS-2018	3/1R	P	F	P					
	ARCS-2020	3/1R	P	F	P					
	ARCS-2022	3/1R	P	F	P					
05-6KA-2008-1	ARCS-2004	3/1R	P	P	P					
	ARCS-2005	3/1R	P	P	P					
	ARCS-2010	3/1R	P	P	P					
	ARCS-2012	3/1R	P	P	P					
	ARCS-2015	3/1R	P	P	P					
	ARCS-2016	3/1R	P	P	P					
	ARCS-2019	3/1R	P	P	P					
	ARCS-2021	3/1R	P	P	P					
05-6KA-2009-1	ARCS-2006	3/1R	P	P	P					
	ARCS-2007	3/1R	P	P	P					
	ARCS-2014	3/1R	P	P	P					

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE	
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)
05-6KA-2010-1	ARCS-2314	2/2								
05-6KA-2011-1	ARCS-2310	2/2								
	ARCS-2311	2/2								
	ARCS-2312	2/2								
	ARCS-2313	2/2								
05-6KA-2014-1	ARCS-1531	3/1R	P	P	P					
	ARCS-1532	3/1R	P	P	P					
	ARCS-1533	3/1R	P	P	P					
	ARCS-1534	3/1R	P	P	P					
05-6KA-2016-1	ARCS-1528	3/3								
	ARCS-1529	3/3								
	ARCS-1530	3/3								
05-6KA-2026-1	ARCS-12076X	3/1R	P	P	P					
05-6KA-2026-2	ARCS-12077X	2/1R	P	P	P					
	ARCS-12078X	2/1R	P	P	P					
	ARCS-12079X	2/1R	P	P	P					
	ARCS-12080X	2/1R	P	P	P					
05-6KA-2028-1	ARCS-12081X	3/1R	P	P	P					
	ARCS-12085X	3/1R	P	P	P					
05-6KA-2028-2	ARCS-12082X	3/1R	P	P	P	2/2			EPD&C 6	X
	ARCS-12083X	3/1R	P	P	P	2/2			EPD&C 6	X
	ARCS-12084X	3/1R	P	P	P	2/2			EPD&C 6	X
05-6KA-2029-1	ARCS-12102X	3/1R	P	P	P					
	ARCS-12106X	3/1R	P	P	P					
05-6KA-2029-2	ARCS-12103X	3/1R	P	P	P	2/2			EPD&C 6	X
	ARCS-12104X	3/1R	P	P	P	2/2			EPD&C 6	X
	ARCS-12105X	3/1R	P	P	P	2/2			EPD&C 6	X
05-6KA-2030-1	ARCS-12172X	3/1R	P	P	P					
	ARCS-12176X	3/1R	P	P	P					
	ARCS-12177X	3/1R	P	P	P					
	ARCS-12181X	3/1R	P	P	P					
	ARCS-12182X	3/1R	P	P	P					
	ARCS-12186X	3/1R	P	P	P					
	ARCS-12187X	3/1R	P	P	P					
	ARCS-12191X	3/1R	P	P	P					
05-6KA-2030-2	ARCS-12173X	3/1R	P	P	P					
	ARCS-12174X	3/1R	P	P	P					
	ARCS-12175X	3/1R	P	P	P					
	ARCS-12178X	3/1R	P	P	P					
	ARCS-12179X	3/1R	P	P	P					
	ARCS-12180X	3/1R	P	P	P					
	ARCS-12183X	3/1R	P	P	P					
	ARCS-12184X	3/1R	P	P	P					
	ARCS-12185X	3/1R	P	P	P					
	ARCS-12188X	3/1R	P	P	P					
	ARCS-12189X	3/1R	P	P	P					
	ARCS-12190X	3/1R	P	P	P					
05-6KA-2032-1	ARCS-12003X	3/1R	P	P	P					

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2032-1	ARCS-12007X	3/1R	P	P	P						
05-6KA-2032-2	ARCS-12004X	3/1R	P	F	P	3/1R	P	P	P	EPD&C 2	X
	ARCS-12005X	3/1R	P	F	P	3/1R	P	P	P	EPD&C 2	X
05-6KA-2035-1	ARCS-12006X	3/1R	P	F	P	3/1R	P	P	P	EPD&C 2	X
	ARCS-12256X	3/1R	P	F	P	2/2				EPD&C 6	X
	ARCS-12259X	3/1R	P	F	P						
	ARCS-12260X	3/1R	P	F	P	2/2				EPD&C 6	X
	ARCS-12266X	3/1R	P	P	P						
	ARCS-12269X	3/1R	P	F	P						
	ARCS-12270X	3/1R	P	F	P						
	ARCS-12276X	3/1R	P	F	P	2/2				EPD&C 6	X
	ARCS-12279X	3/1R	P	F	P						
	ARCS-12280X	3/1R	P	F	P	2/2				EPD&C 6	X
05-6KA-2035-2	ARCS-12286X	3/1R	P	F	P						
	ARCS-12290X	3/1R	P	F	P						
	ARCS-12257X	3/3									
	ARCS-12258X	3/3									
	ARCS-12267X	3/3									
	ARCS-12268X	3/3									
	ARCS-12277X	3/3									
	ARCS-12278X	3/3									
	ARCS-12287X	3/3									
	ARCS-12288X	3/3									
05-6KA-2036-1	ARCS-12289X	3/3									
	ARCS-12261X	3/1R	P	P	P						
	ARCS-12264X	3/1R	P	P	P						
	ARCS-12265X	3/1R	P	P	P						
	ARCS-12271X	3/1R	P	P	P						
	ARCS-12274X	3/1R	P	P	P						
	ARCS-12275X	3/1R	P	P	P						
	ARCS-12281X	3/1R	P	P	P						
	ARCS-12284X	3/1R	P	P	P						
	ARCS-12285X	3/1R	P	P	P						
05-6KA-2036-2	ARCS-12291X	3/1R	P	P	P						
	ARCS-12294X	3/1R	P	P	P						
	ARCS-12295X	3/1R	P	P	P						
	ARCS-12262X	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-12263X	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-12272X	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-12273X	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-12282X	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-12283X	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-12292X	3/1R	P	P	P	3/3				EPD&C 2	X
05-6KA-2037-1	ARCS-12293X	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-12296X	2/2									
	ARCS-12298X	2/2									
	ARCS-12300X	2/2									
	ARCS-12301X	2/2									

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE	
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C		OTHER (SEE LEGEND CODE)
05-6KA-2037-1	ARCS-12303X	2/2							
	ARCS-12305X	2/2							
	ARCS-12306X	2/2							
	ARCS-12308X	2/2							
	ARCS-12310X	2/2							
	ARCS-12311X	2/2							
	ARCS-12313X	2/2							
05-6KA-2037-2	ARCS-12315X	2/2							
	ARCS-12297X	3/3							
	ARCS-12299X	3/3							
	ARCS-12302X	3/3							
	ARCS-12304X	3/3							
	ARCS-12307X	3/3							
05-6KA-2039-1	ARCS-12309X	3/3							
	ARCS-12312X	3/3							
	ARCS-12314X	3/3							
	ARCS-12125X	3/1R	P	P	P				
	ARCS-12128X	3/1R	P	P	P				
	ARCS-12129X	3/1R	P	P	P				
05-6KA-2039-2	ARCS-12146X	3/1R	P	P	P				
	ARCS-12149X	3/1R	P	P	P				
	ARCS-12150X	3/1R	P	P	P				
	ARCS-12126X	3/1R	P	F	P	2/2		EPD&C 3	X
	ARCS-12127X	3/1R	P	F	P	2/2		EPD&C 3	X
05-6KA-2040-1	ARCS-12147X	3/1R	P	F	P	2/2		EPD&C 3	X
	ARCS-12148X	3/1R	P	F	P	2/2		EPD&C 3	X
	ARCS-12167X	3/3							
05-6KA-2040-2	ARCS-12171X	3/3							
	ARCS-12168X	3/3							
05-6KA-2042-1	ARCS-12169X	3/3							
	ARCS-12170X	3/3							
	ARCS-12316X	2/2							
05-6KA-2042-2	ARCS-12318X	2/2							
	ARCS-12320X	2/2							
05-6KA-2076-1	ARCS-12317X	3/3							
	ARCS-12319X	3/3							
	ARCS-1366	3/3							
	ARCS-1367	3/3							
	ARCS-1368	3/3							
	ARCS-1369	3/3							
	ARCS-1370	3/3							
	ARCS-1371	3/3							
	ARCS-1382	3/3							
	ARCS-1383	3/3							
	ARCS-1384	3/3							
	ARCS-1385	3/3							
	ARCS-1386	3/3							
	ARCS-1387	3/3							

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2077-1	ARCS-1372	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1373	3/3									
	ARCS-1374	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1375	3/3									
	ARCS-1378	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1379	3/3									
	ARCS-1380	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1381	3/3									
	ARCS-1388	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1389	3/3									
	ARCS-1390	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1391	3/3									
	ARCS-1394	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1395	3/3									
ARCS-1396	3/3				3/2R	P	P	P	EPD&C 1	X	
ARCS-1397	3/3										
05-6KA-2078-1	ARCS-1376	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1377	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1392	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1393	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2081-1	ARCS-1589	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1591	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1603	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1604	3/3									
05-6KA-2082-1	ARCS-1605	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1597	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1598	3/3									
	ARCS-1601	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2083-1	ARCS-1602	3/3									
	ARCS-1593	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1595	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1599	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2083-2	ARCS-1594	3/3									
	ARCS-1596	3/3									
	ARCS-1600	3/3									
05-6KA-2084-1	ARCS-1609	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1621	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1625	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1637	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2084-2	ARCS-1610	3/3									
	ARCS-1622	3/3									
	ARCS-1626	3/3									
	ARCS-1638	3/3									
05-6KA-2085-1	ARCS-1613	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1614	3/3									
	ARCS-1615	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1616	3/3									
ARCS-1617	3/3				3/2R	P	P	P	EPD&C 1	X	

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C	CRIT HW/F	SCREENS A B C	OTHER (SEE LEGEND CODE)			
05-6KA-2085-1	ARCS-1618	3/3							
	ARCS-1629	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1630	3/3							
05-6KA-2086-1	ARCS-1607	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1611	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1619	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1623	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1624	3/3							
	ARCS-1627	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1631	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1633	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1635	3/3			3/2R		EPD&C 1	X	
05-6KA-2087-1	ARCS-1675	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1676	3/3							
	ARCS-1677	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1678	3/3							
	ARCS-1689	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1690	3/3							
	ARCS-1691	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1692	3/3							
	ARCS-1703	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1704	3/3							
	ARCS-1705	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1706	3/3							
	ARCS-1717	3/3			3/2R	P P P	EPD&C 1	X	
05-6KA-2088-1	ARCS-1718	3/3							
	ARCS-1719	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1720	3/3							
	ARCS-1679	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1680	3/3							
	ARCS-1681	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1682	3/3							
	ARCS-1685	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1686	3/3							
	ARCS-1687	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1688	3/3							
	ARCS-1693	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1694	3/3							
	ARCS-1695	3/3			3/2R	P P P	EPD&C 1	X	
	ARCS-1696	3/3							
ARCS-1699	3/3			3/2R	P P P	EPD&C 1	X		
ARCS-1700	3/3								
ARCS-1701	3/3			3/2R	P P P	EPD&C 1	X		
ARCS-1702	3/3								
ARCS-1707	3/3			3/2R	P P P	EPD&C 1	X		
ARCS-1708	3/3								
ARCS-1709	3/3			3/2R	P P P	EPD&C 1	X		
ARCS-1710	3/3								

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2088-1	ARCS-1713	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1714	3/3									
	ARCS-1715	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1716	3/3									
	ARCS-1721	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1722	3/3									
	ARCS-1723	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1724	3/3									
	ARCS-1727	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1728	3/3									
	ARCS-1729	3/3				3/2R	P	P	P	EPD&C 1	X
ARCS-1730	3/3										
05-6KA-2089-1	ARCS-1683	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1697	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1711	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1725	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2089-2	ARCS-1684	3/3									
	ARCS-1698	3/3									
	ARCS-1712	3/3									
	ARCS-1726	3/3									
05-6KA-2090-1	ARCS-12008X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2090-2	ARCS-12009X	3/3									
05-6KA-2091-1	ARCS-12012X	3/3				3/2R	P	P	P		
	ARCS-12013X	3/3				3/2R	P	P	P		
	ARCS-12014X	3/3				3/2R	P	P	P		
	ARCS-12015X	3/3				3/2R	P	P	P		
05-6KA-2092-1	ARCS-12010X	3/3									
	ARCS-12011X	3/3									
05-6KA-2093-1	ARCS-2029	3/3									
	ARCS-2030	3/3									
	ARCS-2071	3/3									
	ARCS-2072	3/3									
	ARCS-2089	3/3									
	ARCS-2090	3/3									
	ARCS-2125	3/3									
05-6KA-2094-1	ARCS-2126	3/3									
	ARCS-2046	3/1R	P	F	P						
	ARCS-2056	3/1R	P	F	P						
	ARCS-2062	3/1R	P	F	P						
	ARCS-2074	3/1R	P	F	P						
	ARCS-2106	3/1R	P	F	P						
	ARCS-2116	3/1R	P	F	P						
ARCS-2128	3/1R	P	F	P							
05-6KA-2094-2	ARCS-2045	3/3									
	ARCS-2055	3/3									
	ARCS-2061	3/3									
	ARCS-2073	3/3									
	ARCS-2105	3/3									

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C	
05-6KA-2094-1	ARCS-2115	3/3						
	ARCS-2127	3/3						
	05-6KA-2095-1	ARCS-2039	3/3					
05-6KA-2096-1	ARCS-2040	3/3						
	ARCS-2041	3/3						
	ARCS-2042	3/3						
	ARCS-2087	3/3						
	ARCS-2088	3/3						
	ARCS-2051	3/3						
	ARCS-2052	3/3						
	ARCS-2053	3/3						
	ARCS-2054	3/3						
	ARCS-2057	3/3						
	ARCS-2058	3/3						
	ARCS-2059	3/3						
	ARCS-2060	3/3						
	ARCS-2067	3/3						
	ARCS-2068	3/3						
	ARCS-2069	3/3						
	ARCS-2070	3/3						
	ARCS-2079	3/3						
	ARCS-2080	3/3						
	ARCS-2081	3/3						
	ARCS-2082	3/3						
	ARCS-2101	3/3						
	ARCS-2102	3/3						
	ARCS-2103	3/3						
	ARCS-2104	3/3						
	ARCS-2111	3/3						
	ARCS-2112	3/3						
ARCS-2113	3/3							
ARCS-2114	3/3							
ARCS-2121	3/3							
ARCS-2122	3/3							
ARCS-2123	3/3							
ARCS-2124	3/3							
ARCS-2137	3/3							
ARCS-2138	3/3							
ARCS-2139	3/3							
ARCS-2140	3/3							
05-6KA-2097-1	ARCS-2047	3/3						
	ARCS-2048	3/3						
	ARCS-2049	3/3						
	ARCS-2050	3/3						
	ARCS-2083	3/3						
	ARCS-2084	3/3						
ARCS-2085	3/3							
ARCS-2086	3/3							



IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C	
05-6KA-2097-1	ARCS-2107	3/3						
	ARCS-2108	3/3						
	ARCS-2109	3/3						
	ARCS-2110	3/3						
	ARCS-2129	3/3						
	ARCS-2130	3/3						
	ARCS-2131	3/3						
05-6KA-2098-1	ARCS-2132	3/3						
	ARCS-2031	3/3						
	ARCS-2032	3/3						
	ARCS-2033	3/3						
	ARCS-2034	3/3						
	ARCS-2035	3/3						
	ARCS-2036	3/3						
	ARCS-2037	3/3						
	ARCS-2038	3/3						
	ARCS-2063	3/3						
	ARCS-2064	3/3						
	ARCS-2065	3/3						
	ARCS-2066	3/3						
	ARCS-2075	3/3						
	ARCS-2076	3/3						
	ARCS-2077	3/3						
	ARCS-2078	3/3						
	ARCS-2091	3/3						
	ARCS-2092	3/3						
	ARCS-2093	3/3						
	ARCS-2094	3/3						
	ARCS-2097	3/3						
	ARCS-2098	3/3						
ARCS-2099	3/3							
05-6KA-2099-1	ARCS-2100	3/3						
	ARCS-2117	3/3						
	ARCS-2118	3/3						
	ARCS-2119	3/3						
	ARCS-2120	3/3						
	ARCS-2133	3/3						
	ARCS-2134	3/3						
	ARCS-2135	3/3						
	ARCS-2136	3/3						
	ARCS-2324	3/3						
	ARCS-2325	3/3						
	ARCS-2326	3/3						
	ARCS-2327	3/3						
ARCS-2328	3/3							
ARCS-2329	3/3							
ARCS-2330	3/3							
ARCS-2331	3/3							

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2099-1	ARCS-2332	3/3									
	ARCS-2333	3/3									
05-6KA-2102-1	ARCS-1641	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1642	3/3									
	ARCS-1647	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1648	3/3									
	ARCS-1651	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1652	3/3									
	ARCS-1655	3/3				3/2R	P	P	P		
	ARCS-1656	3/3									
	ARCS-1659	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1660	3/3									
	ARCS-1665	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1666	3/3									
	ARCS-1669	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1670	3/3									
	ARCS-1673	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1674	3/3									
05-6KA-2103-1	ARCS-1643	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1645	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1649	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1661	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1663	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1667	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1639	3/3									
	ARCS-1640	3/3									
	ARCS-1653	3/3									
	ARCS-1654	3/3									
	ARCS-1657	3/3									
	ARCS-1658	3/3									
	ARCS-1671	3/3									
	ARCS-1672	3/3									
05-6KA-2109-1	ARCS-2149	3/3									
	ARCS-2150	3/3									
05-6KA-2110-1	ARCS-2141	3/3									
	ARCS-2142	3/3									
	ARCS-2143	3/3									
	ARCS-2144	3/3									
	ARCS-2145	3/3									
	ARCS-2146	3/3									
	ARCS-2147	3/3									
	ARCS-2148	3/3									
05-6KA-2111-1	ARCS-2044	3/1R	P	F	P						
	ARCS-2096	3/1R	P	F	P						
05-6KA-2126-1	ARCS-1545	3/1R	P	P	P	2/2				EPD&C 6	X
	ARCS-1547	3/1R	P	P	P	2/2				EPD&C 6	X
05-6KA-2126-2	ARCS-1546	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1548	3/1R	P	F	P	3/3				EPD&C 2	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2127-1	ARCS-1551	2/2				2/1R	P	P	P	EPD&C 3	X
	ARCS-1555	2/2				2/1R	P	P	P	EPD&C 3	X
05-6KA-2127-2	ARCS-1552	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	ARCS-1556	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
05-6KA-2128-1	ARCS-1575	3/1R	P	P	P						
	ARCS-1579	3/1R	P	P	P						
	ARCS-1583	3/1R	P	P	P						
	ARCS-1585	3/1R	P	P	P						
05-6KA-2128-2	ARCS-1576	2/1R	P	F	P	3/1R	P	P	P	EPD&C 2,3	X
	ARCS-1580	2/1R	P	F	P	3/1R	P	P	P	EPD&C 2,3	X
	ARCS-1584	2/1R	P	F	P	3/1R	P	P	P	EPD&C 2,3	X
	ARCS-1586	2/1R	P	F	P	3/1R	P	P	P	EPD&C 2,3	X
05-6KA-2128A-1	ARCS-1573	3/1R	P	P	P						
	ARCS-1577	3/1R	P	P	P						
	ARCS-1581	3/1R	P	P	P						
	ARCS-1587	3/1R	P	P	P						
05-6KA-2128A-2	ARCS-1574	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
	ARCS-1578	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
	ARCS-1582	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
	ARCS-1588	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
05-6KA-2130-1	ARCS-2023	3/1R	P	P	P						
	ARCS-2025	3/1R	P	P	P						
	ARCS-2027	3/1R	P	P	P						
05-6KA-2130-2	ARCS-2024	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-2026	3/1R	P	P	P	3/3				EPD&C 2	X
	ARCS-2028	3/1R	P	P	P	3/3				EPD&C 2	X
05-6KA-2132-1	ARCS-1561	3/1R	P	P	P						
	ARCS-1563	3/1R	P	P	P						
	ARCS-1569	3/1R	P	P	P						
	ARCS-1571	3/1R	P	P	P						
05-6KA-2132-2	ARCS-1562	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1564	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1570	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1572	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2133-1	ARCS-1557	3/1R	P	P	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1559	3/1R	P	P	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1565	3/1R	P	P	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1567	3/1R	P	P	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2133-2	ARCS-1558	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
	ARCS-1560	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
	ARCS-1566	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
	ARCS-1568	2/1R	P	F	P	3/1R	P	NA	P	EPD&C 2	X
05-6KA-2136-1	ARCS-1541	3/1R	P	P	P						
	ARCS-1543	3/1R	P	P	P						
05-6KA-2136-2	ARCS-1542	2/1R	P	F	P	2/2				EPD&C 3	X
	ARCS-1544	2/1R	P	F	P	2/2				EPD&C 3	X
05-6KA-2137-1	ARCS-1549	3/1R	P	P	P						
	ARCS-1553	3/1R	P	P	P						

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2137-2	ARCS-1550	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	ARCS-1554	2/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
05-6KA-2151-1	ARCS-1413	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2153-1	ARCS-1857	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2154-1	ARCS-1858	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2154-2	ARCS-1858A	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2155-1	ARCS-1859	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2155-2	ARCS-1859A	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2156-1	ARCS-12016X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2156-2	ARCS-12017X	3/3				3/2R	P	P	P		
05-6KA-2159-1	ARCS-1856	3/3				3/2R	P	P	P		
05-6KA-2176-1	ARCS-1306	3/1R	P	P	P						
	ARCS-1308	3/1R	P	P	P						
	ARCS-1314	3/1R	P	P	P						
	ARCS-1316	3/1R	P	P	P						
	ARCS-1307	3/1R	P	P	P						
05-6KA-2176-2	ARCS-1309	3/1R	P	P	P						
	ARCS-1315	3/1R	P	P	P						
	ARCS-1317	3/1R	P	P	P						
05-6KA-2176A-1	ARCS-1302	3/1R	P	P	P						
	ARCS-1304	3/1R	P	P	P						
	ARCS-1310	3/1R	P	P	P						
	ARCS-1312	3/1R	P	P	P						
05-6KA-2176A-2	ARCS-1303	3/3									
	ARCS-1305	3/3									
	ARCS-1311	3/3									
05-6KA-2177-1	ARCS-12018X	3/1R	P	P	P						
05-6KA-2177-2	ARCS-12019X	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2178-1	ARCS-12020X	3/2R	P	P	P	2/2			EPD&C 4	X	
05-6KA-2178-2	ARCS-12021X	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2179-1	ARCS-1873	3/1R	P	P	P						
	ARCS-1875	3/1R	P	P	P						
	ARCS-1881	3/1R	P	P	P						
	ARCS-1885	3/1R	P	P	P						
	ARCS-1888	3/1R	P	P	P						
	ARCS-1890	3/1R	P	P	P						
	ARCS-1897	3/1R	P	P	P						
	ARCS-1901	3/1R	P	P	P						
	ARCS-1872	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1874	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2179-2	ARCS-1880	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1884	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1889	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1891	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1896	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1900	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1877	3/1R	P	P	P						

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE			
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2180-1	ARCS-1879	3/1R	P	P	P						
	ARCS-1883	3/1R	P	P	P						
	ARCS-1887	3/1R	P	P	P						
	ARCS-1893	3/1R	P	P	P						
	ARCS-1895	3/1R	P	P	P						
	ARCS-1899	3/1R	P	P	P						
	ARCS-1903	3/1R	P	P	P						
05-6KA-2180-2	ARCS-1876	3/3									
	ARCS-1878	3/3									
	ARCS-1882	3/3									
	ARCS-1886	3/3									
	ARCS-1892	3/3									
	ARCS-1894	3/3									
	ARCS-1898	3/3									
05-6KA-2184-1	ARCS-1905	2/2									
	ARCS-1907	2/2									
05-6KA-2184-2	ARCS-1904	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1906	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2185-1	ARCS-2001	2/2									
	ARCS-2003	2/2									
05-6KA-2185-2	ARCS-2000	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-2002	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2201-1	ARCS-1346	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1358	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2201-2	ARCS-1347	3/1R	P	P	P						
	ARCS-1349	3/1R	P	P	P						
	ARCS-1359	3/1R	P	P	P						
	ARCS-1361	3/1R	P	P	P						
05-6KA-2201A-1	ARCS-1348	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1360	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2202-1	ARCS-1342	3/1R	P	P	P						
	ARCS-1344	3/1R	P	P	P						
	ARCS-1354	3/1R	P	P	P						
	ARCS-1356	3/1R	P	P	P						
05-6KA-2202-2	ARCS-1343	3/1R	P	P	P						
	ARCS-1345	3/1R	P	P	P						
	ARCS-1355	3/1R	P	P	P						
	ARCS-1357	3/1R	P	P	P						
05-6KA-2202A-1	ARCS-1338	3/1R	P	P	P						
	ARCS-1340	3/1R	P	P	P						
	ARCS-1350	3/1R	P	P	P						
	ARCS-1352	3/1R	P	P	P						
05-6KA-2202A-2	ARCS-1339	3/1R	P	P	P						
	ARCS-1341	3/1R	P	P	P						
	ARCS-1351	3/1R	P	P	P						
05-6KA-2206-1	ARCS-1353	3/1R	P	P	P						
	ARCS-1472	3/3				3/2R	P	P	P	EPD&C 1	X

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NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2206-1	ARCS-1474	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2206-2	ARCS-1473	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1475	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2207-1	ARCS-1478	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1484	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2207-2	ARCS-1479	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1485	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2207A-1	ARCS-1476	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1477	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1482	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1483	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2208-1	ARCS-1496	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1498	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1500	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1502	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1504	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1506	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1508	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1510	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2208-2	ARCS-1497	3/1R	P	P	P						
	ARCS-1499	3/1R	P	P	P						
	ARCS-1501	3/1R	P	P	P						
	ARCS-1503	3/1R	P	P	P						
	ARCS-1505	3/1R	P	P	P						
	ARCS-1507	3/1R	P	P	P						
	ARCS-1509	3/1R	P	P	P						
	ARCS-1511	3/1R	P	P	P						
05-6KA-2210-1	ARCS-12024X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2210-2	ARCS-12025X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KA-2210A-1	ARCS-12022X	3/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2210A-2	ARCS-12023X	3/1R	P	F	P						
05-6KA-2211-1	ARCS-12030X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KA-2211-2	ARCS-12031X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2212-1	ARCS-12028X	3/1R	P	P	P						
05-6KA-2212-2	ARCS-12029X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2213-1	ARCS-12026X	3/1R	P	P	P						
05-6KA-2213-2	ARCS-12027X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2213A-1	ARCS-12032X	3/2R	P	P	P	2/2				EPD&C 4	X
05-6KA-2213A-2	ARCS-12033X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2214-1	ARCS-1981	3/1R	P	P	P						
	ARCS-1983	3/1R	P	P	P						
	ARCS-1985	3/1R	P	P	P						
	ARCS-1987	3/1R	P	P	P						
	ARCS-1989	3/1R	P	P	P						
	ARCS-1991	3/1R	P	P	P						
	ARCS-1993	3/1R	P	P	P						
	ARCS-1995	3/1R	P	P	P						
05-6KA-2214-2	ARCS-1980	3/1R	P	F	P	3/3				EPD&C 2	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2214-2	ARCS-1982	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1984	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1986	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1988	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1990	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1992	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1994	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2216-1	ARCS-2300	2/2									
	ARCS-2302	2/2									
	ARCS-2304	2/2									
	ARCS-2306	2/2									
05-6KA-2216-2	ARCS-2301	3/3									
	ARCS-2303	3/3									
	ARCS-2305	3/3									
	ARCS-2307	3/3									
05-6KA-2217-1	ARCS-1488	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1490	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1492	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1494	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2217-2	ARCS-1489	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1491	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1493	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1495	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2219-1	ARCS-1480	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
	ARCS-1486	2/1R	P	F	P	3/2R	P	P	P	EPD&C 2	X
05-6KA-2219-2	ARCS-1481	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1487	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2220-1	ARCS-1997	2/2									
	ARCS-1999	2/2									
05-6KA-2220-2	ARCS-1996	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-1998	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2222-1	ARCS-2308	2/2									
05-6KA-2222-2	ARCS-2309	3/3									
05-6KA-2224-1	ARCS-12034X	3/1R	P	P	P	2/2				EPD&C 4	X
05-6KA-2224-2	ARCS-12035X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2251-1	ARCS-1318	3/1R	P	P	P						
	ARCS-1320	3/1R	P	P	P						
	ARCS-1328	3/1R	P	P	P						
	ARCS-1330	3/1R	P	P	P						
	ARCS-1319	3/3									
05-6KA-2251-2	ARCS-1321	3/3									
	ARCS-1329	3/3									
	ARCS-1331	3/3									
	ARCS-1322	3/1R	P	P	P						
05-6KA-2252-1	ARCS-1324	3/1R	P	P	P						
	ARCS-1332	3/1R	P	P	P						
	ARCS-1334	3/1R	P	P	P						
	ARCS-1322	3/1R	P	P	P						
05-6KA-2252-2	ARCS-1323	3/1R	P	F	P	3/3				EPD&C 2	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUI			
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2252-2	ARCS-1325	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1333	3/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-1335	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2252-3	ARCS-12340X	3/1R	P	F	P						
	ARCS-12341X	3/1R	P	F	P						
	ARCS-12342X	3/1R	P	F	P						
	ARCS-12343X	3/1R	P	F	P						
05-6KA-2253-1	ARCS-12086X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12088X	2/1R	P	P	P	3/3			EPD&C 2	X	
05-6KA-2253-2	ARCS-12087X	3/3									
	ARCS-12089X	3/3									
05-6KA-2253A-1	ARCS-12090X	3/2R	P	P	P						
05-6KA-2253A-2	ARCS-12091X	3/3									
05-6KA-2253B-1	ARCS-12092X	3/1R	P	P	P						
05-6KA-2253B-2	ARCS-12093X	3/3									
05-6KA-2253C-1	ARCS-12094X	3/1R	P	P	P						
05-6KA-2253C-2	ARCS-12095X	3/3									
05-6KA-2253D-1	ARCS-12096X	3/1R	P	P	P						
05-6KA-2253D-2	ARCS-12097X	3/3									
05-6KA-2253E-1	ARCS-12098X	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2253E-2	ARCS-12099X	2/1R	P	F	P	2/2			EPD&C 3	X	
05-6KA-2253F-1	ARCS-12100X	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2253F-2	ARCS-12101X	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2254-1	ARCS-12107X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12109X	2/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2254-2	ARCS-12108X	3/3									
	ARCS-12110X	3/3									
05-6KA-2254A-1	ARCS-12111X	3/2R	P	P	P						
05-6KA-2254A-2	ARCS-12112X	3/3									
05-6KA-2254B-1	ARCS-12113X	3/1R	P	P	P						
05-6KA-2254B-2	ARCS-12114X	3/3									
05-6KA-2254C-1	ARCS-12115X	3/1R	P	P	P						
05-6KA-2254C-2	ARCS-12116X	3/3									
05-6KA-2254D-1	ARCS-12117X	3/1R	P	P	P						
05-6KA-2254D-2	ARCS-12118X	3/3									
05-6KA-2254E-1	ARCS-12119X	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2254E-2	ARCS-12120X	3/1R	P	F	P	2/2			EPD&C 3	X	
05-6KA-2254F-1	ARCS-12121X	3/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2254F-2	ARCS-12122X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	ARCS-12192X	2/1R	P	F	P	3/3			EPD&C 2	X	
05-6KA-2255-1	ARCS-12194X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12208X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12210X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12224X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12226X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12240X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12242X	2/1R	P	F	P	3/3			EPD&C 2	X	
	ARCS-12193X	3/3				3/2R	P	P	P	EPD&C 1	X



IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2255-2	ARCS-12195X	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-12209X	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-12211X	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-12225X	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-12227X	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-12241X	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-12243X	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2255A-1	ARCS-12196X	3/3									
	ARCS-12212X	3/3									
	ARCS-12228X	3/3									
05-6KA-2255A-2	ARCS-12197X	3/3									
	ARCS-12213X	3/3									
	ARCS-12229X	3/3									
05-6KA-2255B-1	ARCS-12198X	3/1R	P	P	P						
	ARCS-12214X	3/1R	P	P	P						
	ARCS-12230X	3/1R	P	P	P						
	ARCS-12246X	3/1R	P	P	P						
05-6KA-2255B-2	ARCS-12199X	3/3									
		3/3									
	ARCS-12215X	3/3									
	ARCS-12247X	3/3									
05-6KA-2255C-1	ARCS-12200X	3/1R	P	P	P						
	ARCS-12216X	3/1R	P	P	P						
	ARCS-12232X	3/1R	P	P	P						
	ARCS-12248X	3/1R	P	P	P						
05-6KA-2255C-2	ARCS-12201X	3/3									
	ARCS-12217X	3/3									
	ARCS-12233X	3/3									
	ARCS-12249X	3/3									
05-6KA-2255D-1	ARCS-12202X	3/1R	P	P	P						
	ARCS-12218X	3/1R	P	P	P						
	ARCS-12234X	3/1R	P	P	P						
	ARCS-12250X	3/1R	P	P	P						
05-6KA-2255D-2	ARCS-12203X	3/3									
	ARCS-12219X	3/3									
	ARCS-12235X	3/3									
	ARCS-12251X	3/3									
05-6KA-2255E-1	ARCS-12204X	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-12220X	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-12236X	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-12252X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2255E-2	ARCS-12205X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	ARCS-12221X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	ARCS-12237X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	ARCS-12253X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C	CRIT HW/F	SCREENS A B C	OTHER (SEE LEGEND CODE)		
05-6KA-2255F-1	ARCS-12206X	3/1R	P F P	3/3		EPD&C 2	X	
	ARCS-12222X	3/1R	P F P	3/3		EPD&C 2	X	
	ARCS-12238X	3/1R	P F P	3/3		EPD&C 2	X	
	ARCS-12254X	3/1R	P F P	3/3		EPD&C 2	X	
05-6KA-2255F-2	ARCS-12207X	3/1R	P F P	3/1R	P F P	EPD&C 3	X	
	ARCS-12223X	3/1R	P F P	3/1R	P F P	EPD&C 3	X	
	ARCS-12239X	3/1R	P F P	3/1R	P F P	EPD&C 3	X	
	ARCS-12255X	3/1R	P F P	3/1R	P F P	EPD&C 3	X	
05-6KA-2257-1	ARCS-12036X	3/1R	P F P	3/3		EPD&C 2	X	
05-6KA-2257-2	ARCS-12037X	3/3		3/2R	P F P	EPD&C 6	X	
05-6KA-2257A-1	ARCS-12038X	3/1R	P F P	3/3		EPD&C 2	X	
05-6KA-2257A-2	ARCS-12039X	3/2R	P P P					
05-6KA-2257B-1	ARCS-12046X	3/2R	P P P					
	ARCS-12048X	3/2R	P P P					
05-6KA-2257B-2	ARCS-12047X	3/2R	P P P					
	ARCS-12049X	3/2R	P P P					
05-6KA-2257C-1	ARCS-12044X	3/2R	P P P					
	ARCS-12050X	3/2R	P P P					
05-6KA-2257C-2	ARCS-12045X	3/3						
	ARCS-12051X	3/3						
05-6KA-2257D-1	ARCS-12040X	3/1R	P P P					
	ARCS-12058X	3/1R	P P P					
05-6KA-2257D-2	ARCS-12041X	3/3						
	ARCS-12059X	3/3						
05-6KA-2257E-1	ARCS-12042X	3/3						
	ARCS-12060X	3/3						
05-6KA-2257E-2	ARCS-12043X	3/3						
	ARCS-12061X	3/3						
05-6KA-2257F-1	ARCS-12062X	3/1R	P P P					
05-6KA-2257F-2	ARCS-12063X	3/2R	P P P	3/3		EPD&C 2	X	
05-6KA-2257G-1	ARCS-12064X	3/3						
05-6KA-2257G-2	ARCS-12065X	3/3						
05-6KA-2257H-1	ARCS-12066X	3/2R	P P P					
05-6KA-2257H-2	ARCS-12067X	3/3						
05-6KA-2258-1	ARCS-12052X	3/2R	P P P	2/2		EPD&C 4	X	
05-6KA-2258-2	ARCS-12053X	3/3						
05-6KA-2258-3	ARCS-12344X	3/2R	P P P	2/2		EPD&C 4	X	
05-6KA-2259-1	ARCS-1915	3/1R	P F P					
	ARCS-1923	3/1R	P F P					
	ARCS-1927	3/1R	P F P					
	ARCS-1935	3/1R	P F P					
	ARCS-1949	3/1R	P F P					
	ARCS-1955	3/1R	P F P					
	ARCS-1961	3/1R	P F P					
	ARCS-1969	3/1R	P F P					
05-6KA-2259-2	ARCS-1914	3/3						
	ARCS-1922	3/3						
	ARCS-1926	3/3						

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE	
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C		OTHER (SEE LEGEND CODE)
05-6KA-2259-2	ARCS-1934	3/3							
	ARCS-1948	3/3							
	ARCS-1954	3/3							
	ARCS-1960	3/3							
	ARCS-1968	3/3							
05-6KA-2259A-1	ARCS-1917	3/1R	P	F	P				
	ARCS-1925	3/1R	P	F	P				
	ARCS-1929	3/1R	P	F	P				
	ARCS-1937	3/1R	P	F	P				
	ARCS-1951	3/1R	P	F	P				
	ARCS-1957	3/1R	P	F	P				
	ARCS-1963	3/1R	P	F	P				
	ARCS-1971	3/1R	P	F	P				
05-6KA-2259A-2	ARCS-1916	3/3							
	ARCS-1924	3/3							
	ARCS-1928	3/3							
	ARCS-1936	3/3							
	ARCS-1950	3/3							
	ARCS-1956	3/3							
	ARCS-1962	3/3							
	ARCS-1970	3/3							
05-6KA-2260-1	ARCS-12345X	3/1R	P	F	P				
	ARCS-12346X	3/1R	P	F	P				
	ARCS-12349X	3/1R	P	F	P				
	ARCS-12350X	3/1R	P	F	P				
	ARCS-12353X	3/1R	P	F	P				
	ARCS-12354X	3/1R	P	F	P				
	ARCS-12356X	3/1R	P	F	P				
	ARCS-12357X	3/1R	P	F	P				
	ARCS-12358X	3/1R	P	F	P				
	ARCS-1909	3/1R	P	F	P				
	ARCS-1911	3/1R	P	F	P				
	ARCS-1931	3/1R	P	F	P				
	ARCS-1941	3/1R	P	F	P				
	ARCS-1943	3/1R	P	F	P				
	ARCS-1945	3/1R	P	F	P				
ARCS-1965	3/1R	P	F	P					
ARCS-1975	3/1R	P	F	P					
05-6KA-2260-2	ARCS-1908	3/3							
	ARCS-1910	3/3							
	ARCS-1930	3/3							
	ARCS-1940	3/3							
	ARCS-1942	3/3							
	ARCS-1944	3/3							
	ARCS-1964	3/3							
05-6KA-2261-1	ARCS-12130X	2/1R	P	F	P	3/3		EPD&C 2	X
	ARCS-12132X	2/1R	P	F	P	3/3		EPD&C 2	X

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2261-1	ARCS-12151X	2/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-12153X	2/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2261-2	ARCS-12131X	3/3									
	ARCS-12133X	3/3									
	ARCS-12152X	3/3									
	ARCS-12154X	3/3									
05-6KA-2261A-1	ARCS-12134X	3/1R	P	P	P						
	ARCS-12155X	3/1R	P	P	P						
05-6KA-2261A-2	ARCS-12135X	3/3									
	ARCS-12156X	3/3									
05-6KA-2261B-1	ARCS-12136X	3/1R	P	P	P						
	ARCS-12157X	3/1R	P	P	P						
05-6KA-2261B-2	ARCS-12137X	3/3									
	ARCS-12158X	3/3									
05-6KA-2261C-1	ARCS-12138X	3/1R	P	P	P						
	ARCS-12159X	3/1R	P	P	P						
05-6KA-2261C-2	ARCS-12139X	3/3									
	ARCS-12160X	3/3									
05-6KA-2261D-1	ARCS-12140X	3/1R	P	P	P						
	ARCS-12161X	3/1R	P	P	P						
05-6KA-2261D-2	ARCS-12141X	3/3									
	ARCS-12162X	3/3									
05-6KA-2261E-1	ARCS-12142X	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-12163X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2261E-2	ARCS-12143X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
	ARCS-12164X	3/1R	P	F	P	3/1R	P	F	P	EPD&C 3	X
05-6KA-2261F-1	ARCS-12144X	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-12165X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2261F-2	ARCS-12145X	3/1R	P	F	P	3/3				EPD&C 2	X
	ARCS-12166X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2265-1	ARCS-12347X	3/1R	P	F	P						
	ARCS-12348X	3/1R	P	F	P						
	ARCS-12351X	3/1R	P	F	P						
	ARCS-12352X	3/1R	P	F	P						
	ARCS-12355X	3/1R	P	F	P						
	ARCS-12359X	3/1R	P	F	P						
	ARCS-12360X	3/1R	P	F	P						
	ARCS-1913	3/1R	P	F	P						
	ARCS-1920	3/1R	P	F	P						
	ARCS-1933	3/1R	P	F	P						
	ARCS-1939	3/1R	P	F	P						
	ARCS-1953	3/1R	P	F	P						
	ARCS-1959	3/1R	P	F	P						
05-6KA-2265-2	ARCS-1967	3/1R	P	F	P						
	ARCS-1973	3/1R	P	F	P						
	ARCS-1912	3/3									
	ARCS-1921	3/3									
	ARCS-1932	3/3									

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
05-6KA-2265-2	ARCS-1938	3/3									
	ARCS-1952	3/3									
	ARCS-1958	3/3									
	ARCS-1966	3/3									
	ARCS-1972	3/3									
05-6KA-2267-1	ARCS-1326	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1336	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2267-2	ARCS-1327	3/3									
	ARCS-1337	3/3									
05-6KA-2268-1	ARCS-12123X	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2268-2	ARCS-12124X	3/1R	P	P	P	3/3				EPD&C 2	X
05-6KA-2269-1	ARCS-1448	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1452	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1456	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1460	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-1449	3/1R	P	P	P						
05-6KA-2269-2	ARCS-1453	3/1R	P	P	P						
	ARCS-1457	3/1R	P	P	P						
	ARCS-1461	3/1R	P	P	P						
05-6KA-2270-1	ARCS-12361X	2/2									
	ARCS-12362X	2/2									
	ARCS-1977	2/2									
	ARCS-1979	2/2									
05-6KA-2270-2	ARCS-1976	3/3									
	ARCS-1978	3/3									
05-6KA-2271-1	ARCS-1919	3/1R	P	F	P						
	ARCS-1947	3/1R	P	F	P						
05-6KA-2271-2	ARCS-1918	3/3									
	ARCS-1946	3/3									
05-6KA-2279-1	ARCS-12054X	3/3				3/2R	P	P	P	EPD&C 1	X
	ARCS-12056X	3/3				3/2R	P	P	P	EPD&C 1	X
05-6KA-2279-2	ARCS-12055X	3/3									
	ARCS-12057X	3/3									
05-6KA-2280-1	ARCS-12072X	3/1R	P	P	P	2/2				EPD&C 4	X
05-6KA-2280-2	ARCS-12073X	3/1R	P	F	P	3/3				EPD&C 2	X
05-6KA-2302-1	ARCS-12322X	2/1R	P	P	P						
	ARCS-12324X	2/1R	P	P	P						
05-6KA-2303-1	ARCS-12321X	2/1R	P	P	P						
	ARCS-12323X	2/1R	P	P	P						
NONE	ARCS-12068X					3/1R	P	NA	P	EPD&C 5	X
	ARCS-12069X					3/3				EPD&C 5	X
	ARCS-12070X					3/1R	P	NA	P	EPD&C 5	X
	ARCS-12071X					3/3				EPD&C 5	X
	ARCS-12074X					3/2R	P	P	P	EPD&C 5	X
	ARCS-12075X					3/2R	P	P	P	EPD&C 5	X
	ARCS-12325X										
	ARCS-12326X										
	ARCS-12327X										

IDENTIFIERS		NASA			IOA RECOMMENDATIONS				ISSUE		
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	
NONE	ARCS-12328X										
	ARCS-12329X					2/1R	P	P	P	EPD&C 5	X
	ARCS-12330X					3/3				EPD&C 5	X
	ARCS-12331X					3/2R	P	P	P	EPD&C 5	X
	ARCS-12332X					2/2				EPD&C 5	X
	ARCS-12333X					3/1R	P	P	P	EPD&C 5	X
	ARCS-12334X					3/1R		NA	P	EPD&C 5	X
	ARCS-12335X					3/1R		P	P	EPD&C 5	X
	ARCS-12336X					3/2R		P	P	EPD&C 1,5	X
	ARCS-12337X					3/2R		P	P	EPD&C 1,5	X
	ARCS-12338X					3/2R		P	P	EPD&C 1,5	X
	ARCS-12339X					3/2R		P	P	EPD&C 1,5	X
	ARCS-1644					3/3				EPD&C 5	X
	ARCS-1646					3/3				EPD&C 5	X
	ARCS-1650					3/3				EPD&C 5	X
	ARCS-1662					3/3				EPD&C 5	X
	ARCS-1664					3/3				EPD&C 5	X
	ARCS-1668					3/3				EPD&C 5	X
	ARCS-2043										
	ARCS-2095										
	ARCS-2263										
	ARCS-2264										
	ARCS-2265										
	ARCS-2266										
	ARCS-2267										
	ARCS-2286					3/2R		P	P	EPD&C 5	X
	ARCS-2287					3/2R		P	P	EPD&C 5	X
	ARCS-2288					3/2R		P	P	EPD&C 5	X
	ARCS-2296					3/3				EPD&C 5	X
	ARCS-2297					3/2R	P	P	P	EPD&C 5	X
	ARCS-2334					3/2R	F	P		EPD&C 5	X
	ARCS-2335					3/3				EPD&C 5	X
	ARCS-2336					3/2R	P	F	P	EPD&C 5	X
	ARCS-2337					3/3				EPD&C 5	X
	ARCS-2338					3/2R	P	F	P	EPD&C 5	X
	ARCS-2339					3/3				EPD&C 5	X
	ARCS-2340					2/2				EPD&C 5	X
	ARCS-2341					3/3				EPD&C 5	X

APPENDIX G

SUMMARY OF RCS ANALYSIS AND ASSESSMENT SHEETS  
SUPERSEDED BY APPENDIX E DUE TO RE-ANALYSIS

APPENDIX G

SUMMARY OF ASSESSMENT SHEETS SUPERCEDED BY APPENDIX F DUE TO RE-ANALYSIS

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	FRCS-1058										
	FRCS-1059										
	FRCS-1060										
	FRCS-1061										
	FRCS-1062										
	FRCS-1063										
	FRCS-1064										
	FRCS-1065										
	FRCS-1066										
	FRCS-1067										
	FRCS-1068										
	FRCS-1069										
	FRCS-1070										
	FRCS-1071										
	FRCS-1072										
	FRCS-1073										
	FRCS-1074										
	FRCS-1075										
	FRCS-1076										
	FRCS-1077										
	FRCS-1078										
	FRCS-1079										
	FRCS-1080										
	FRCS-1081										
	FRCS-1082										
	FRCS-1083										
	FRCS-1084										
	FRCS-1085										
	FRCS-1086										
	FRCS-1087										
	FRCS-1088										
	FRCS-1089										
	FRCS-1090										
	FRCS-1091										
	FRCS-1092										
	FRCS-1093										
	FRCS-1094										
	FRCS-1095										
	FRCS-1096										
	FRCS-1097										
	FRCS-1098										
	FRCS-1099										
	FRCS-1100										
	FRCS-1101										



IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	FRCS-1102										
	FRCS-1103										
	FRCS-1104										
	FRCS-1105										
	FRCS-1106										
	FRCS-1107										
	FRCS-1108										
	FRCS-1109										
	FRCS-1110										
	FRCS-1111										
	FRCS-1112										
	FRCS-1113										
	FRCS-1114										
	FRCS-1115										
	FRCS-1116										
	FRCS-1117										
	FRCS-1118										
	FRCS-1119										
	FRCS-1120										
	FRCS-1121										
	FRCS-1122										
	FRCS-1123										
	FRCS-1124										
	FRCS-1125										
	FRCS-1126										
	FRCS-1127										
	FRCS-1128										
	FRCS-1129										
	FRCS-1130										
	FRCS-1131										
	FRCS-1247										
	FRCS-1248										
	FRCS-1249										
	FRCS-1250										
	FRCS-1251										
	FRCS-1252										
	FRCS-1253										
	FRCS-1254										
	FRCS-1255										
	FRCS-1256										
	FRCS-1257										
	FRCS-1258										
	FRCS-1259										
	FRCS-1260										
	FRCS-1261										
	FRCS-1262										
	FRCS-1263										
	FRCS-1264										

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IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	FRCS-1265										
	FRCS-1266										
	FRCS-1267										
	FRCS-1268										
	FRCS-1269										
	FRCS-1270										
	FRCS-1271										
	FRCS-1272										
	FRCS-1273										
	FRCS-1274										
	FRCS-1275										
	FRCS-1276										
	FRCS-1277										
	FRCS-1278										
	FRCS-1279										
	FRCS-1280										
	FRCS-1281										
	FRCS-1282										
	FRCS-1283										
	FRCS-1284										
	FRCS-1285										
	FRCS-1286										
	FRCS-1287										
	FRCS-1288										
	FRCS-1289										
	FRCS-358										
	FRCS-359										
	FRCS-360										
	FRCS-361										
	FRCS-362										
	FRCS-363										
	FRCS-364										
	FRCS-365										
	FRCS-366										
	FRCS-367										
	FRCS-368										
	FRCS-369										
	FRCS-370										
	FRCS-371										
	FRCS-372										
	FRCS-383										
	FRCS-384										
	FRCS-532										
	FRCS-533										
	FRCS-534										
	FRCS-535										
	FRCS-536										
	FRCS-537										

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	FRCS-538										
	FRCS-539										
	FRCS-540										
	FRCS-541										
	FRCS-542										
	FRCS-543										
	FRCS-544										
	FRCS-545										
	FRCS-546										
	FRCS-547										
	FRCS-548										
	FRCS-549										
	FRCS-550										
	FRCS-551										
	FRCS-552										
	FRCS-553										
	FRCS-554										
	FRCS-555										
	FRCS-556										
	FRCS-557										
	FRCS-558										
	FRCS-559										
	FRCS-560										
	FRCS-561										
	FRCS-562										
	FRCS-563										
	FRCS-564										
	FRCS-565										
	FRCS-566										
	FRCS-567										
	FRCS-656										
	FRCS-657										
	FRCS-658										
	FRCS-659										
	FRCS-660										
	FRCS-661										
	FRCS-662										
	FRCS-663										
	FRCS-664										
	FRCS-665										
	FRCS-666										
	FRCS-667										
	FRCS-684										
	FRCS-685										
	FRCS-686										
	FRCS-687										
	FRCS-688										
	FRCS-689										

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C	CRIT HW/F	SCREENS A B C	OTHER (SEE LEGEND CODE)		
	FRCS-690							
	FRCS-691							
	FRCS-692							
	FRCS-693							
	FRCS-694							
	FRCS-695							
	FRCS-700							
	FRCS-701							
	FRCS-774							
	FRCS-775							
	FRCS-776							
	FRCS-777							
	FRCS-778							
	FRCS-779							
	FRCS-780							
	FRCS-781							
	FRCS-782							
	FRCS-783							
	FRCS-784							
	FRCS-785							
	FRCS-786							
	FRCS-787							
	FRCS-788							
	FRCS-789							
	FRCS-790							
	FRCS-791							
	FRCS-792							
	FRCS-793							
	FRCS-794							
	FRCS-795							
	FRCS-796							
	FRCS-797							
	FRCS-798							
	FRCS-799							
	FRCS-800							
	FRCS-801							
	FRCS-802							
	FRCS-803							
	FRCS-804							
	FRCS-805							
	FRCS-806							
	FRCS-807							
	FRCS-808							
	FRCS-809							
	FRCS-810							
	FRCS-811							
	FRCS-812							
	FRCS-813							

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	FRCS-814										
	FRCS-815										
	FRCS-816										
	FRCS-817										
	FRCS-818										
	FRCS-819										
	FRCS-820										
	FRCS-821										
	FRCS-822										
	FRCS-823										
	FRCS-824										
	FRCS-825										
	FRCS-826										
	FRCS-827										
	FRCS-828										
	FRCS-829										
	FRCS-830										
	FRCS-831										
	FRCS-832										
	FRCS-833										
	FRCS-834										
	FRCS-835										
	FRCS-836										
	FRCS-837										
	FRCS-838										
	FRCS-839										
	FRCS-840										
	FRCS-884										

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C	
	ARCS-1398							
	ARCS-1399							
	ARCS-1400							
	ARCS-1401							
	ARCS-1402							
	ARCS-1403							
	ARCS-1404							
	ARCS-1405							
	ARCS-1406							
	ARCS-1407							
	ARCS-1408							
	ARCS-1409							
	ARCS-1410							
	ARCS-1411							
	ARCS-1412							
	ARCS-1426							
	ARCS-1427							
	ARCS-1428							
	ARCS-1429							
	ARCS-1430							
	ARCS-1431							
	ARCS-1432							
	ARCS-1433							
	ARCS-1434							
	ARCS-1435							
	ARCS-1436							
	ARCS-1437							
	ARCS-1438							
	ARCS-1439							
	ARCS-1440							
	ARCS-1441							
	ARCS-1442							
	ARCS-1443							
	ARCS-1444							
	ARCS-1445							
	ARCS-1446							
	ARCS-1447							
	ARCS-1450							
	ARCS-1451							
	ARCS-1454							
	ARCS-1455							
	ARCS-1458							
	ARCS-1459							
	ARCS-1462							
	ARCS-1463							
	ARCS-1464							
	ARCS-1465							
	ARCS-1466							

IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C	CRIT HW/F	SCREENS A B C	OTHER (SEE LEGEND CODE)		
	ARCS-1467							
	ARCS-1468							
	ARCS-1469							
	ARCS-1470							
	ARCS-1471							
	ARCS-1512							
	ARCS-1513							
	ARCS-1514							
	ARCS-1515							
	ARCS-1516							
	ARCS-1517							
	ARCS-1518							
	ARCS-1519							
	ARCS-1520							
	ARCS-1521							
	ARCS-1522							
	ARCS-1523							
	ARCS-1539							
	ARCS-1540							
	ARCS-1590							
	ARCS-1592							
	ARCS-1606							
	ARCS-1608							
	ARCS-1612							
	ARCS-1620							
	ARCS-1628							
	ARCS-1632							
	ARCS-1634							
	ARCS-1636							
	ARCS-1731							
	ARCS-1732							
	ARCS-1733							
	ARCS-1734							
	ARCS-1735							
	ARCS-1736							
	ARCS-1737							
	ARCS-1738							
	ARCS-1739							
	ARCS-1740							
	ARCS-1741							
	ARCS-1742							
	ARCS-1743							
	ARCS-1744							
	ARCS-1745							
	ARCS-1746							
	ARCS-1747							
	ARCS-1748							

IDENTIFIERS		NASA			IOA RECOMMENDATIONS *						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	ARCS-1749										
	ARCS-1750										
	ARCS-1751										
	ARCS-1752										
	ARCS-1753										
	ARCS-1754										
	ARCS-1755										
	ARCS-1756										
	ARCS-1757										
	ARCS-1758										
	ARCS-1759										
	ARCS-1760										
	ARCS-1761										
	ARCS-1762										
	ARCS-1763										
	ARCS-1764										
	ARCS-1765										
	ARCS-1766										
	ARCS-1767										
	ARCS-1768										
	ARCS-1769										
	ARCS-1770										
	ARCS-1771										
	ARCS-1772										
	ARCS-1773										
	ARCS-1774										
	ARCS-1775										
	ARCS-1776										
	ARCS-1777										
	ARCS-1778										
	ARCS-1779										
	ARCS-1780										
	ARCS-1781										
	ARCS-1782										
	ARCS-1783										
	ARCS-1784										
	ARCS-1785										
	ARCS-1786										
	ARCS-1787										
	ARCS-1788										
	ARCS-1789										
	ARCS-1790										
	ARCS-1791										
	ARCS-1792										
	ARCS-1793										
	ARCS-1794										
	ARCS-1795										
	ARCS-1796										



IDENTIFIERS		NASA			IOA RECOMMENDATIONS			ISSUE
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C		CRIT HW/F	SCREENS A B C		
	ARCS-1797							
	ARCS-1798							
	ARCS-1799							
	ARCS-1800							
	ARCS-1801							
	ARCS-1802							
	ARCS-1803							
	ARCS-1804							
	ARCS-1805							
	ARCS-1806							
	ARCS-1807							
	ARCS-1808							
	ARCS-1809							
	ARCS-1810							
	ARCS-1811							
	ARCS-1812							
	ARCS-1813							
	ARCS-1814							
	ARCS-1815							
	ARCS-1816							
	ARCS-1817							
	ARCS-1818							
	ARCS-1819							
	ARCS-1820							
	ARCS-1821							
	ARCS-1822							
	ARCS-1823							
	ARCS-1824							
	ARCS-1825							
	ARCS-1826							
	ARCS-1827							
	ARCS-1828							
	ARCS-1829							
	ARCS-1830							
	ARCS-1831							
	ARCS-1832							
	ARCS-1833							
	ARCS-1834							
	ARCS-1835							
	ARCS-1836							
	ARCS-1837							
	ARCS-1838							
	ARCS-1839							
	ARCS-1840							
	ARCS-1841							
	ARCS-1842							
	ARCS-1843							
	ARCS-1844							

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	ARCS-1845										
	ARCS-1846										
	ARCS-1847										
	ARCS-1848										
	ARCS-1849										
	ARCS-1850										
	ARCS-1851										
	ARCS-1852										
	ARCS-1853										
	ARCS-1854										
	ARCS-1855										
	ARCS-2151										
	ARCS-2152										
	ARCS-2153										
	ARCS-2154										
	ARCS-2155										
	ARCS-2156										
	ARCS-2157										
	ARCS-2158										
	ARCS-2159										
	ARCS-2160										
	ARCS-2161										
	ARCS-2162										
	ARCS-2163										
	ARCS-2164										
	ARCS-2165										
	ARCS-2166										
	ARCS-2167										
	ARCS-2168										
	ARCS-2169										
	ARCS-2170										
	ARCS-2171										
	ARCS-2172										
	ARCS-2173										
	ARCS-2174										
	ARCS-2175										
	ARCS-2176										
	ARCS-2177										
	ARCS-2178										
	ARCS-2179										
	ARCS-2180										
	ARCS-2181										
	ARCS-2182										
	ARCS-2183										
	ARCS-2184										
	ARCS-2185										
	ARCS-2186										
	ARCS-2187										

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	ARCS-2188										
	ARCS-2189										
	ARCS-2190										
	ARCS-2191										
	ARCS-2192										
	ARCS-2193										
	ARCS-2194										
	ARCS-2195										
	ARCS-2196										
	ARCS-2197										
	ARCS-2198										
	ARCS-2199										
	ARCS-2200										
	ARCS-2201										
	ARCS-2202										
	ARCS-2203										
	ARCS-2204										
	ARCS-2205										
	ARCS-2206										
	ARCS-2207										
	ARCS-2208										
	ARCS-2209										
	ARCS-2210										
	ARCS-2211										
	ARCS-2212										
	ARCS-2213										
	ARCS-2214										
	ARCS-2215										
	ARCS-2216										
	ARCS-2217										
	ARCS-2218										
	ARCS-2219										
	ARCS-2220										
	ARCS-2221										
	ARCS-2222										
	ARCS-2223										
	ARCS-2224										
	ARCS-2225										
	ARCS-2226										
	ARCS-2227										
	ARCS-2228										
	ARCS-2229										
	ARCS-2230										
	ARCS-2231										
	ARCS-2232										
	ARCS-2233										
	ARCS-2234										
	ARCS-2235										

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	ARCS-2236										
	ARCS-2237										
	ARCS-2238										
	ARCS-2239										
	ARCS-2240										
	ARCS-2241										
	ARCS-2242										
	ARCS-2243										
	ARCS-2244										
	ARCS-2245										
	ARCS-2246										
	ARCS-2247										
	ARCS-2248										
	ARCS-2249										
	ARCS-2250										
	ARCS-2251										
	ARCS-2252										
	ARCS-2253										
	ARCS-2254										
	ARCS-2255										
	ARCS-2256										
	ARCS-2257										
	ARCS-2258										
	ARCS-2259										
	ARCS-2260										
	ARCS-2261										
	ARCS-2262										
	ARCS-2315										
	ARCS-2342										
	ARCS-2343										
	ARCS-2344										
	ARCS-2345										
	ARCS-2346										
	ARCS-2347										
	ARCS-2348										
	ARCS-2349										
	ARCS-2350										
	ARCS-2351										
	ARCS-2352										
	ARCS-2353										
	ARCS-2354										
	ARCS-2355										
	ARCS-2356										
	ARCS-2357										
	ARCS-2358										
	ARCS-2359										
	ARCS-2360										
	ARCS-2361										

IDENTIFIERS		NASA			IOA RECOMMENDATIONS						
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A B C			CRIT HW/F	SCREENS A B C			OTHER (SEE LEGEND CODE)	ISSUE
	ARCS-2362										
	ARCS-2363										
	ARCS-2364										
	ARCS-2365										
	ARCS-2366										
	ARCS-2367										
	ARCS-2368										
	ARCS-2369										
	ARCS-2370										
	ARCS-2371										





**MCDONNELL DOUGLAS AERONAUTICS COMPANY - HOUSTON**  
**16055 SPACE CENTER BLVD, HOUSTON, TEXAS 77062**