INDEPENDENT ORBITER ASSESSMENT

ASSESSMENT
OF THE
REACTION CONTROL
SYSTEM
Vol. 5 of 5

26 FEBRUARY 1988
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

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

SUBSYSTEM: FRCS
MDAC ID: 10001

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 1/1
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LIFFTOFF</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/2R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>2/2</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 1/1</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-4
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AGA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-5
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>2/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-6
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td>ACA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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) 

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLIGHT PHASE</td>
</tr>
<tr>
<td>PRELAUNCH:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
</tr>
<tr>
<td>ONORBIT:</td>
</tr>
<tr>
<td>DEORBIT:</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
</tr>
</tbody>
</table>


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 VIOLATONS 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

REPORT DATE : 2/26/88  E-8
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/21/87
SUBSYSTEM: FRCS
MDAC ID: 10008

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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)

HARDWARE COMPONENTS
ASSEMBLIES
PRESSURE RELIEF ASSEMBLY

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/21/87
SUBSYSTEM: FRCS
MDAC ID: 10009

MDAC ID: 9/21/87

HIGHEST CRITICALITY     HDW/FUNC
FLIGHT: 1/1
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORB:</td>
<td>1/1</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-10
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-11
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/23/87
SUBSYSTEM: FRCS
MDAC ID: 10011

HIGHEST CRITICALITY
HDW/FUNC

FLIGHT: 2/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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  E-12
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/24/87
SUBSYSTEM: FRCS
MDAC ID: 10012

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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-13
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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  E-14
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/24/87
SUBSYSTEM: FRCS
MDAC ID: 10014

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>1/1</td>
<td>AOA: 1/1</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAF:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/28/87
SUBSYSTEM: FRCS
MDAC ID: 10015

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-16
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/28/87

HIGHEST CRITICALITY
HDW/FUNC

SUBSYSTEM: FRCS

MDAC ID: 10016

ITEM: THRUSTER BIPROP SOLENOID VALV, 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 VALV, PRIMARY, ALL AXES

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/ FUNC</th>
<th>ABORT</th>
<th>HDW/ FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td>AOA: 1/1</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAfING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88   E-18
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>1/1</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>1/1</td>
<td>AOA: 1/1</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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, 11.6  2) VS70-942099, 42BN, BT

REPORT DATE: 2/26/88  E-19
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/29/87
MDAC ID: 10019

HIGHEST CRITICALITY
FLIGHT: 1/1
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 N204 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

REPORT DATE: 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/2R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIR</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/02/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>ARCS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>10021</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ITEM:</td>
<td>HE ISOL VLV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAILURE MODE:</td>
<td>EXTERNAL LEAKAGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEAD ANALYST:</td>
<td>C.D. PRUST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUBSYS LEAD:</td>
<td>C.D. PRUST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>2/2</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/05/87
SUBSYSTEM: ARCS
MDAC ID: 10022

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) HARDWARE
6) ASSEMBLIES
7) HE PRESS SUBSYSTEM
8) HE PRESS REGULATOR ASSEMBLY

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/05/87
SUBSYSTEM: ARCS
MDAC ID: 10023

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>2/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-24
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td>AOA: 1/1</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 CONSTRAINTS. 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

REPORT DATE: 2/26/88  E-25
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>2/1R</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>2/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/1R</td>
<td>AOA:</td>
<td>21/R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO:</td>
<td>21/R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>2/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 CONSTRAINTS. 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

REPORT DATE: 2/26/88  E-26
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/87
SUBSYSTEM: ARCS
MDAC ID: 10026

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
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)...

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/87
SUBSYSTEM: ARCS
MDAC ID: 10027

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>1/1</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>1/1</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-28
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/06/87
SUBSYSTEM: ARCS
MDAC ID: 10028

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 VLVES 3/4/5
5)
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>2/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/1R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
</tbody>
</table>


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 MIXTURE 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
SUBSYSTEM: ARCS
MDAC ID: 10029

HIGHEST CRITICALITY
FLIGHT: 1/1
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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, 43CB, DB

REPORT DATE: 2/26/88 E-30
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>2/1R</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>2/1R</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/1R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>2/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: MC284-0430

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

REPORT DATE: 2/26/88 E-31
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/07/87
SUBSYSTEM: ARCS
MDAC ID: 10031

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-32
INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/07/87  
SUBSYSTEM: ARCS  
MDAC ID: 10032  

HIGHEST CRITICALITY  HDW/FUNC  FLIGHT: 3/1R  
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  

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  
E-33
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/87
SUBSYSTEM: ARCS
MDAC ID: 10033

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/08/87
SUBSYSTEM: ARCS
MDAC ID: 10034

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 2/2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/2R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/87
SUBSYSTEM: ARCS
MDAC ID: 10035

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>1/1</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>1/1</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>1/1</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SA:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>1/1</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>1/1</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>1/1</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-37
INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/09/87

SUBSYSTEM: ARCS
MDAC ID: 10037

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-38
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87
SUBSYSTEM: ARCS
MDAC ID: 10038

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONUORBIT:</td>
<td>1/1</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87
SUBSYSTEM: ARCS
MDAC ID: 10039

HIGHEST CRITICALITY
HDW/FUNC
1/1
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRelaunch:</td>
<td>1/1</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>Liftoff:</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>OnOrbit:</td>
<td>1/1</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>Deorbit:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>Landing/Safing</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87  
SUBSYSTEM: ARCS  
MDAC ID: 10040  

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
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)  

CRITICALITIES  

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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  

REPORT DATE : 2/26/88  
E-41
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87

SUBSYSTEM: ARCS
MDAC ID: 10041

HIGHEST CRITICALITY
FLIGHT: 1/1
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONSORBIT:</td>
<td>1/1</td>
<td>AOA: 1/1</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO: 1/1</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 N204 IN INJECTOR, OR BURN-THROUGH OF INJECTOR RESULTS IN POSSIBLE FIRE/EXPLOSION AND DAMAGE TO VEHICLE.

REFERENCES: 1) JSC 11174 2) VS70-943099

REPORT DATE: 2/26/88 E-42
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/26/87
SUBSYSTEM: FRCS
MDAC ID: 10042

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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>/NA</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td>AOA:</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td>ATO:</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>/NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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) VS70-942099

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/26/87
SUBSYSTEM: ARCS
MDAC ID: 10043

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>/NA</td>
<td>RTLS</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>1/1</td>
<td>TAL</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>1/1</td>
<td>AOA</td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>1/1</td>
<td>ATO</td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>/NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-44
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/28/87
SUBSYSTEM: FRCS
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

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>1/1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-45
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/13/87
SUBSYSTEM: ARCS
MDAC ID: 10138

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11001

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


LOCATION: PNL 08 S34
PART NUMBER: 33V73A8 P39

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

REPORT DATE : 2/26/88 E-47
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11002

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 08 S34
PART NUMBER: 33V73A8 F44

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

EFFECTS/RATIONALE:
LOSE CAPABILITY TO MANUALLY OPEN OR CLOSE THE ISOLATION VALVE WITH SWITCH 34. GPC CAPABILITY TO CLOSE VALVE IS STILL OPERABLE. GPC CAPABILITY TO OPEN VALVE IS NOT OPERABLE. THE ISOLATION VALVE THEREFORE CANNOT BE CLOSED, 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

REPORT DATE: 2/26/88 E-48
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11003

ITEM: MANIFOLD 5, OX & FU ISOL VLVS
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 VLVS SWITCH

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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**

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>FRCS</td>
<td>FLIGHT:</td>
<td>3/1R</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>11004</td>
<td>ABORT:</td>
<td>3/1R</td>
</tr>
</tbody>
</table>

**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

**CRITICALITIES**

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
</tbody>
</table>

**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

**REPORT DATE:** 2/26/88  
**E-50**
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS
MDAC ID: 11005

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

REFERENCES: ECN 102-8023A

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11006

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-52
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11007

HIGHEST CRITICALITY

FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/Func</th>
<th>ABORT</th>
<th>HDW/Func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RLTS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-53
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11008

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-54
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11009

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11010

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-56
**INDEPENDENT ORBITER ASSESSMENT**

**ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

**DATE:** 10/01/87

**SUBSYSTEM:** FRCS

**MDAC ID:** 11011

**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**

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**LOCATION:** AV BAY 6, PCA 3

**PART NUMBER:** 83V76A24 J14-95

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

**EFFECTS/RATIONALE:**

NO EFFECT. LOSE CAPABILITY TO MONITOR RPC 29 STATUS WITH MDM OF3. DATA NOT MISSION CRITICAL.

**REFERENCES:** ECN 102-8023A

**REPORT DATE:** 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11012

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-58
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

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

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/.func</th>
<th>ABORT</th>
<th>HDW/func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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
SUBSYSTEM: FRCS
MDAC ID: 11014

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

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

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ON ORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-60
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11015

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-61
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11016

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-62
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11017

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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
SUBSYSTEM: FRCS
MDAC ID: 11019

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-65
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11020

HIGHEST CRITICALITY

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-66
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 OFL.

REFERENCES: ECN 102-8023A
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11022

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ON ORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-68
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11023

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 5, OX & FU ISOL VLVS
5) DRIVER, HYBRID

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11024

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-70
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11025

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-71
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-72
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11027

ITEM: DRIVER, HYBRID
FAILURE MODE: FAILS HIGH

LEAD ANALYST: D. HARTMAN

SUBSYSTEM HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 5, OX & FU ISOL VLVS
5) DRIVER, HYBRID

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11028

HIGHEST CRITICALITY

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-74
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11029

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-75
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>PRELAUNCH</th>
<th>LIFTOFF</th>
<th>ONORBIT</th>
<th>DEORBIT</th>
<th>LANDING/SAFING</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDW/FUNC</td>
<td>3/3</td>
<td>3/3</td>
<td>2/2</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>ABORT</td>
<td>RTLS: 3/3</td>
<td>TAL: 3/3</td>
<td>AOA: 3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>HDW/FUNC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3/3</td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88        E-76
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY  HDW/FUNC
SUBSYSTEM: FRCS  FLIGHT: 3/3
MDAC ID: 11031  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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:
NO EFFECT. LOSE INHIBIT TO TURN ON RPC 29. OTHER INHIBITS REQUIRED TO OPEN VALVE.

REFERENCES: ECN 102-8023A

REPORT DATE: 2/26/88  E-77
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11032

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11033

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

<table>
<thead>
<tr>
<th>ITEM: DRIVER, HYBRID</th>
<th>FAILURE MODE: FAILS OPEN</th>
</tr>
</thead>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-80
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCs
MDAC ID: 11035

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: FRCS
MDAC ID: 11036

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>FRCs</td>
<td>FLIGHT:</td>
<td>3/2R</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>11037</td>
<td>ABORT:</td>
<td>3/2R</td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-83
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11038

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-84
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11039

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-85
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11044

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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
SUBSYSTEM: FRCS
MDAC ID: 11045

HIGHEST CRITICALITY
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>ACA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 FFI STIMULI. LOSE MANUAL CLOSE INHIBIT TO THE TYPE III "CLOSE" DRIVER.

REFERENCES: ECN 102-8023A

REPORT DATE: 2/26/88 E-87
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/Func</th>
<th>ABORT</th>
<th>HDW/Func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11047

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

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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-90
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11049

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td>[]</td>
<td>[]</td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-91
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11050

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-92
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11051

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

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

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

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

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

REFERENCES: ECN 102-8023A

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCs
MDAC ID: 11052

HIGHEST CRITICALITY

HDW/FUNC
FLIGHT: 3/2R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-94
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>FRCS</td>
<td>FLIGHT: 3/3</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>11053</td>
<td>ABORT: 3/3</td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prelaunch:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>Liftoff:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>Onorbit:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>Deorbit:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>Landing/Safing:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-95
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCs
MDAC ID: 11054

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11055

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELANCEH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-97
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11056

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)

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLIGHT PHASE</td>
</tr>
<tr>
<td>PRELAUNCH:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
</tr>
<tr>
<td>ONORBIT:</td>
</tr>
<tr>
<td>DEORBIT:</td>
</tr>
<tr>
<td>LANDING/SAINING:</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-98
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11057

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

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

ITEM: DIODE
FAILURE MODE: FAILS OPEN

LEAD ANALYST: D. HARTMAN
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-100
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11059

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-101
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-102
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS

MDAC ID: 11061

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS
MDAC ID: 11062

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-104
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11063

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-105
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCs
MDAC ID: 11064

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRLAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-106
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11065

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-107
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11066

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-108
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11067

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABOERT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-109
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11068

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-110
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-111
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11070

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88

E-112
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS
MDAC ID: 11071

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LAND/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11072

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: MANIFOLD 5, OX ISOL VLVS
PART NUMBER: 22V42LV258J1-1 (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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: MANIFOLD 5, OX ISOL VLVS
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

REPORT DATE : 2/26/88  E-115
**INDEPENDENT ORBITER ASSESSMENT**
**ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>FRCS</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>11074</td>
</tr>
</tbody>
</table>

**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  

**CRITICALITIES**

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/S AFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


**LOCATION:** MANIFOLD 5, FU ISOL VLVS  
**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

**REPORT DATE:** 2/26/88  
**E-116**
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11075

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: MANIFOLD 5, FU ISOL VLVS
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

REPORT DATE : 2/26/88 E-117
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11076

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

HIGHEST CRITICALITY
FLIGHT: 3/1R
ABORT: 3/1R

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ON ORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-118
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11077

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFIN:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-119
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11078

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: MANIFOLD 5, OX & FU ISOL VLVS
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

REPORT DATE : 2/26/88   E-120
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11079

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFIN</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: MANIFOLD 5, OX & FU ISOL VLVS
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

REPORT DATE: 2/26/88 E-121
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11080

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LTOORBIT</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
</tbody>
</table>


LOCATION: PNL 08
PART NUMBER: 33V73A8816; 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:

REPORT DATE: 2/26/88  E-122
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11081

HIGHEST CRITICALITY
FLIGHT: 2/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>2/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>2/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ORBIT:</td>
<td>2/1R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>2/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-123
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11082

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>2/1R</td>
<td></td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>2/1R</td>
<td></td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/1R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>2/1R</td>
<td></td>
<td>2/1R</td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-124
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11083

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88 E-125
INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET  

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11084 

HIGHEST CRITICALITY  
HDW/FUNC  
FLIGHT: 3/1R  
ABORT: 3/1R 

ITEM: HE OX & FU ISOL VALV 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 VALV A OR B SWITCH 16 OR 17  

CRITICALITIES  

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:  

REPORT DATE: 2/26/88  
E-126
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88  E-127
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11086

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88 E-128
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11087

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORB:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-129
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88 E-130
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11089

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 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. BOUNDARIES.

REFERENCES:

REPORT DATE: 2/26/88 E-131
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>AOA</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88  E-132
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11091

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88  E-133
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11092

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88   E-134
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS

MDAC ID: 11093

HIGHEST CRITICALITY  HDW/FUNC

FLIGHT: 3/1R

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88 E-135
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFINING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88 E-136
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11095

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-137
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11096

HIGHEST CRITICALITY

HDW/FUNC

FLIGHT: 2/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-138
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11097

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: MANIFOLD 1, OX & FU ISOL VLVS SWCH 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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-139
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11098

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88   E-140
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCs
MDAC ID: 11099

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11100

HIGHEST CRITICALITY
FLIGHT: 3/1R
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 VLV
5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 31
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>TAL:  3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>AOA:  3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>ATO:  3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-142
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 08 $31
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

REPORT DATE : 2/26/88 E-143
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-144
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11103

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-145
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11104

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
ABORT: 2/1R

ITEM: MANIFOLD 2, OX & FU ISOL VLVS 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 VLVS SWITCH 31

6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-146
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11105

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11106

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-148
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11107

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 VLV
5) MANIFOLD 3, OX & FU ISOL VLV SWITCH 32

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFINING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-149
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY  HDW/FUNC FLIGHT: 3/1R
SUBSYSTEM: FRCS  ABORT: 3/1R
MDAC ID: 11108

ITEM: MANIFOLD 3, OX & FU ISOL VLVS 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 VLVS
5) MANIFOLD 3, OX & FU ISOL VLVS SWITCH 32
6) 
7) 
8) 
9) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-150
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY
SUBSYSTEM: FRCS  HDW/FUNC
MDAC ID: 11109  FLIGHT: 3/1R

ITEM: MANIFOLD 3, OX & FU ISOL VLV SWITCH 32
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 3, OX & FU ISOL VLVS
5) MANIFOLD 3, OX & FU ISOL VLV SWITCH 32

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 08 S32
PART NUMBER: 33V73A8S32

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

REPORT DATE : 2/26/88  E-151
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) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
7) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
8) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33
9) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-152
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRC
MDAC ID: 11111

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 VLV
5) MANIFOLD 4, OX & FU ISOL VLV SWITCH 33

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>O/NORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-153
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-154
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>FRCS</td>
<td>FLIGHT:</td>
<td>3/1R</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>11113</td>
<td>ABORT:</td>
<td>3/1R</td>
</tr>
</tbody>
</table>

ITEM: MANIFOLD 4, OX & FU ISOL VLVS 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 VLVS SWITCH 33

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-155
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-156
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

FLIGHT PHASE  HDW/FUNC  ABORT  HDW/FUNC
PRELAUNCH: 3/3  RTLS: 2/1R
LIFTOFF: 3/1R  TAL: 2/1R
ONORB: 3/2R  AOA: 2/1R
DEORB: 2/1R  ATO: 2/1R
LAND/SAFING: 3/3

CRITICALITIES

REFERENCES: VS70-942099 REV D ED D01, AN; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.10, RCS SIG 1

REPORT DATE: 2/26/88  E-157
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11116
HIGHEST CRITICALITY HDW/FUNC
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 i1.10, RCS SIG 1

REPORT DATE: 2/26/88 E-158
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCs
MDAC ID: 11117

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

ITEM: RJDIF1B 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) RJDIF1B F1 MANIFOLD LOGIC SWITCH 7
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>RTLS: 3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-159
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11118

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88      E-160
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11119

HIGHEST CRITICALITY: HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: RJDF1F1 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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 TETS. 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

REPORT DATE: 2/26/88 E-161
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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  E-162
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11121

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-163
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS
MDAC ID: 11122

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORB:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAF:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-164
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-165
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11124

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAINING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-166
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11125

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 1/1

ITEM: RJDF1A F2 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 2, RJDF
5) RJDF1A F2 MANIFOLD LOGIC SWITCH 7

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 015 S7
PART NUMBER: 33V73A15S7

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 2 JETS. MANIFOLD 4 JETS PROVIDES -Y AND -Z THRUST REDUNDANCY AND MANIFOLD 1 OR 3 JETS PROVIDE + AND -X THRUST REDUNDANCY. LOSS OF ALL REDUNDANCY PREVENTS FRCS DUMP REQUIRED TO EXPEL PROPELLANTS TO MEET C.G. CONRAINTS AND CAUSES 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

REPORT DATE : 2/26/88 E-167
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11126

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11127

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-169
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11128

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-170
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRERELAUNCH</td>
<td>3/3</td>
<td>RTLS</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 015 S7
PART NUMBER: 3373A15S7

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

REPORT DATE: 2/26/88  E-171
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11130

HIGHEST CRITICALITY
FLIGHT: 2/1R
ABORT: 1/1

ITEM: RJDF1A F2 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 2, RJDF
5) RJDF1A F2 MANIFOLD DRIVER SWITCH 8

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 015 S8
PART NUMBER: 33V73A15S8

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

EFFECTS/RATIONALE:
LOSE CAPABILITY TO TURN ON DRIVER POWER. THIS CAUSES 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 ENOUGH 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

REPORT DATE: 2/26/88   E-172
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS
MDAC ID: 11131

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-173
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS

MDAC ID: 11132

HIGHEST CRITICALITY HDW/FUNC

FLIGHT: 3/3

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-174
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11133

HIGHEST CRITICALITY: HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-175
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11134

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-176
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11135

ITEM: RJDF2A F3 MANIFOLD LOGIC SWITCH 5
FAILURE MODE: SWICH 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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-177
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FACS
MDAC ID: 11136

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-178
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS

MDAC ID: 11137

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88

E-179
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11138

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RTLS: 1/1
TAL: 1/1
AOA: 3/3
ATO: 3/3


LOCATION: PNL 016 S5
PART NUMBER: 33V73A165S

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

REPORT DATE: 2/26/88 E-180
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>1/1</td>
</tr>
<tr>
<td>ON ORBIT</td>
<td>3/2R</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-181
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11140

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-182
INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY  HDW/FUNC
SUBSYSTEM: FRCS  FLIGHT: 3/3
MDAC ID: 11141  ABORT: 3/3

ITEM: RJDF2A F3 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 3, RJDF
5) RJDF2A F3 MANIFOLD DRIVER SWITCH 6

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: PNL 016 S6
PART NUMBER: 33V73A1686

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

REPORT DATE: 2/26/88  E-183
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11142

HIGHEST CRITICALITY
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11143

ITEM: RJDF2A F3 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 3, RJDF
5) RJDF2A F3 MANIFOLD DRIVER SWITCH 6
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: PNL 016 S6
PART NUMBER: 33V73A16S6

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

REPORT DATE : 2/26/88  E-185
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-186
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11145

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 (VERNERS) 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

REPORT DATE : 2/26/88   E-187
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY  HDW/FUNC
SUBSYSTEM: FRC5  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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-188
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS

MDAC ID: 11147

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>1/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-189
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS

MDAC ID: 11148

HIGHEST CRITICALITY

HDW/FUNC

FLIGHT: 3/1R

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11149

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-191
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-192
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-193
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-194
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11153  

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  

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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  

REPORT DATE: 2/26/88  E-195
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11154

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-196
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11155

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88

E-197
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11156

HIGHEST CRITICALITY
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS</td>
<td>3/3</td>
</tr>
<tr>
<td>LIPOFF</td>
<td>3/3</td>
<td>TAL</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-198
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11157

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-199
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

HIGHEST CRITICALITY

FLIGHT: 3/3

ABORT: 3/3

SUBSYSTEM: FRCS

MDAC ID: 11158

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-200
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11159

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11160

HIGHEST CRITICALITY:
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-202
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11161

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE : 2/26/88 E-203
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11162

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-204
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11163

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>RTLS:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>TAL:</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>AOA:</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>ATO:</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88 E-205
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11164

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88 E-206
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11165

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/2R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-207
INDEPENDENT ORBITER ASSESSMENT
ORBiter SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11166

HIGHEST CRITICALITY  HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE : 2/26/88 E-208
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS
MDAC ID: 11167

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88 E-209
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11168

HIGHEST CRITICALITY

<table>
<thead>
<tr>
<th>FLIGHT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE : 2/26/88 E-210
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11169

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-211
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11170

HIGHEST CRITICALITY: FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88  E-212
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88  E-213
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11172

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

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLIGHT PHASE</strong></td>
</tr>
<tr>
<td>PRELAUNCH:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
</tr>
<tr>
<td>ONORBIT:</td>
</tr>
<tr>
<td>DEORBIT:</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
</tr>
</tbody>
</table>


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:

REPORT DATE: 2/26/88 E-214
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88 E-215
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11174

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

CRITICALITIES
FLIGHT PHASE HDW/FUNC ABDRT 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


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:

REPORT DATE : 2/26/88 E-216
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11175

HIGHEST CRITICALITY
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL A14 S17
PART NUMBER: 36V73A14S17

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

EFFECTS/RATIONALE:
PROPPELLANTS 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:

REPORT DATE : 2/26/88     E-217
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11176

HIGHEST CRITICALITY HDW/FUNC
ORBIT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 ADDITIONAL FAILURE (THERMOSTAT) TO CAUSE OVERHEATING OF PROPELLANTS.

REFERENCES:

REPORT DATE: 2/26/88 E-218
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88  E-219
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: PNL A14 S17
PART NUMBER: 36V73A14517

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

EFFECTS/RATIONALE: NO EFFECT.

REFERENCES:

REPORT DATE: 2/26/88  E-220
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11179

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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:

REPORT DATE : 2/26/88 E-221
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11180

HIGHEST CRITICALITY

FLIGHT: 2/2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: PNL A14 S18
PART NUMBER: 36V73A14S18

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

EFFECTS/RATIONALE:
PROPPELLANTS 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:

REPORT DATE: 2/26/88 E-222
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11181

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88 E-223
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88  E-224
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>FRCS</td>
<td>FLIGHT:</td>
<td>3/3</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>11183</td>
<td>ABORT:</td>
<td>3/3</td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88   E-225
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11184

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE : 2/26/88  E-226
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11185

HIGHEST CRITICALITY

<table>
<thead>
<tr>
<th>HDW/FUNC</th>
<th>FLIGHT:</th>
<th>ABORT:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2/2</td>
<td>2/2</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88  E-227
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11186

HIGHEST CRITICALITY
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 DRAWN INCORRECTLY ON SCHEMATIC VS70-942099. REFER TO SPACE SHUTTLE SYSTEMS HANDBOOK.

REFERENCES:

REPORT DATE: 2/26/88 E-228
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11187

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

REPORT DATE: 2/26/88 E-229
INDPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: FRCS  
MDAC ID: 11188

HIGHEST CRITICALITY  
FLIGHT: 3/3  
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

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:

REPORT DATE: 2/26/88  
E-230
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11189

ITEM: SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS
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) HTR SYSTEM A/B, OX
5) SWITCH, TOGGLE RCS/OMS HEATERS FWD RCS
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL A14 S3
PART NUMBER: 36V73A14S3

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

EFFECTS/RATIONALE:
SWITCH SHORTS TO CASE, ASSOCIATED 1 AMP FUSE WITH BLOW.
REDUNDANCY IS PROVIDED WITHIN THE SWITCH. LOSS OF ALL REDUNDANCY MAY CAUSE OXIDIZER AND FUEL PROPELLANTS TO FREEZE DUE TO INABILITY TO TURN ON PANEL HEATERS. MANEUVERING CAPABILITIES THUS MISSION OBJECTIVES MAY BE LIMITED. NOTE: SWITCH DRAWN INCORRECTLY ON SHEMATIC VS70-942099. REFER TO SPACE SHUTTLE SYSTEMS HANDBOOK. ALSO SPACE SHUTTLE SYSTEMS HANDBOOK SHOWS 3 AMP FUSES BUT SCHEMATIC VS70-942099 SHOWS 1 AMP FUSES.

REFERENCES:

REPORT DATE: 2/26/88 E-231
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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-232
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11191

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-233
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11192

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88    E-234
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/2R</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 03 M11
PART NUMBER: 33V73A3M11

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

REPORT DATE : 2/26/88  E-235
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11194

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/2R</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 03 M9
PART NUMBER: 33V73A3M9

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

REPORT DATE: 2/26/88 E-236
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11195

ITEM: SIGNAL CONDITIONER OF2
FAILRE 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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>2/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFIN:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-237
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11196

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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-238
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11197

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>2/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-239
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11198

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) THRUSTERS, FWD
5) JET DRIVER (PRIMARY-ALL)
6) 
7) 
8) 
9) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>/</td>
<td>RTLS: /</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>/</td>
<td>TAL: /</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>/</td>
<td>AOA: /</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>/</td>
<td>ATO: /</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:
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 FRCS DUMP.

REFERENCES: VS70-942099 REV C EO D01; JSC-20923 PCN-1

REPORT DATE : 2/26/88 E-240
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11199

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>/</td>
<td>RTLS:</td>
<td>/</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>/</td>
<td>TAL:</td>
<td>/</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>/</td>
<td>AGA:</td>
<td>/</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>/</td>
<td>ATO:</td>
<td>/</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>/</td>
<td></td>
<td>/</td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-241
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11200

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>/</td>
<td>RTLS:</td>
<td>/</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>/</td>
<td>TAL:</td>
<td>/</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>/</td>
<td>AOA:</td>
<td>/</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>/</td>
<td>ATO:</td>
<td>/</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88

E-242
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11201

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>/</td>
<td>RTLS:</td>
<td>/</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>/</td>
<td>TAL:</td>
<td>/</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>/</td>
<td>AOA:</td>
<td>/</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>/</td>
<td>ATO:</td>
<td>/</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-243
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11202

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-244
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11203

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-245
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11204

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-246
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11205

HIGHEST CRITICALITY
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11206

HIGHEST CRITICALITY
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-248
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11207

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTL5:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-249
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3 RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3 TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3 ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-250
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11209

HIGHEST CRITICALITY

FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/Func</th>
<th>ABORT</th>
<th>HDW/Func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88   E-251
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: FRCS

MDAC ID: 11210

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11211

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABO RT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-253
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11212

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/func</th>
<th>ABORT</th>
<th>HDW/func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11213

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFIN</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-256
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11215

HIGHEST CRITICALITY
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-257
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11216

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-258
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11217

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-259
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11218

HIGHEST CRITICALITY
FLIGHT: 2/2
ABORT: 2/2

MDAC ID:

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

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/SFING: 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

REPORT DATE: 2/26/88 E-260
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11219

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 E-261
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: FRCS
MDAC ID: 11220

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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
SUBSYSTEM: FRCS
MDAC ID: 11221

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 2/2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-263
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-264
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12002

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-265
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12003

HIGHEST CRITICALITY     HDW/FUNC
FLIGHT: 3/1R
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 VLV SWITCH
5) MANIFOLD 5, L/R OX & FU ISOL VLV SWITCH
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-266
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>ARCS</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>12004</td>
</tr>
<tr>
<td>HIGHEST CRITICALITY</td>
<td>FLIGHT: 3/1R</td>
</tr>
<tr>
<td></td>
<td>ABORT: 3/1R</td>
</tr>
<tr>
<td>ITEM:</td>
<td>MANIFOLD #5, L/R OX &amp; FU ISOL VLV SWITCH</td>
</tr>
<tr>
<td>FAILURE MODE:</td>
<td>SWITCH FAILS SHORT (WORST CASE)</td>
</tr>
<tr>
<td>LEAD ANALYST:</td>
<td>D. HARTMAN</td>
</tr>
<tr>
<td>SUBSYS LEAD:</td>
<td>C.D. PRUST</td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-267
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 VLV
5) MANIFOLD 5, L/R OX & FU ISOL VLV SWITCH
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-268
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 VLVS 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 VLVS SWITCH

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ON ORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-269
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>ARCS</td>
<td>FLIGHT:</td>
<td>3/1R</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>12007</td>
<td>ABORT:</td>
<td>3/1R</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


**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

REPORT DATE : 2/26/88  E-270
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12008

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AGA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-271
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
HIGHEST CRITICALITY: 3/3
SUBSYSTEM: ARCS
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-272
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12010

HIGHEST CRITICALITY
HDW/FUNC

FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-273
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12011

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-274
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12012

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LONORBIT:</td>
<td>3/2R</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 FAI, 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

REPORT DATE : 2/26/88 E-275
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12013

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: AV BAY 6, LCA 3
PART NUMBER: 56V76A123R J2-40, J2-22

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

EFFECTS/RATIONALE:
LOOSE 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

REPORT DATE: 2/26/88 E-276
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12014

HIGHEST CRITICALITY
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 SUBSYSTEMS
4) MANIFOLD 5, L/R OX & FU ISOL VLVS
5) RESISTOR, 5.1K 1/4W

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 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

REPORT DATE: 2/26/88 E-277
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-278
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12016

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-279
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-280
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12018

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-281
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORB:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-282
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12020

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
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/ROX & FU ISOL VLVS
5) CONTROLLER, REMOTE POWER

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>RTLS: 3/3</th>
<th>TAL: 3/3</th>
<th>AOA: 3/3</th>
<th>ATO: 2/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td></td>
<td>3/3</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td></td>
<td>2/2</td>
<td>3/3</td>
<td>3/3</td>
<td>2/2</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-283
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12021  

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 OA1.

REFERENCES: ECN 102-8023A

REPORT DATE: 2/26/88  
E-284
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>ARCS</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>12022</td>
</tr>
<tr>
<td>ITEM:</td>
<td>DRIVER, HYBRID</td>
</tr>
<tr>
<td>FAILURE MODE:</td>
<td>FAILS OPEN</td>
</tr>
<tr>
<td>LEAD ANALYST:</td>
<td>D. HARTMAN</td>
</tr>
<tr>
<td>SUBSYS LEAD:</td>
<td>C.D. PRUST</td>
</tr>
</tbody>
</table>

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEMS
4) MANIFOLD 5, L/R OX & FU ISOL VLVS
5) DRIVER, HYBRID

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-285
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12023

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-286
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12024

HIGHEST CRITICALITY
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-287
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12025

HIGHEST CRITICALITY
FLIGHT: 2/2
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-288
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 VALVS
5) DRIVER, HYBRID
6) 
7) 
8) 
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-289
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12027

HIGHEST CRITICALITY
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12028

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-291
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12029

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-292
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FAILURE MODE</th>
<th>LEAD ANALYST</th>
<th>SUBSYS LEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DRIVER, HYBRID</td>
<td>D. HARTMAN</td>
<td>C.D. PRUST</td>
</tr>
</tbody>
</table>

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) PROP STOR & DIST SUBSYSTEMS
4) MANIFOLD 5, L/R OX & FU ISOL VLVS
5) DRIVER, HYBRID

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-293
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12031

HIGHEST CRITICALITY
HDW/FUNC FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12032

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-295
INDEPENDENT ORBITER ASSESSMENT
ORBiter SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12033

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABO RT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SIFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 VALUE (WITH BOTH SOLENOIDS ENERGIZED, VALUE 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

REPORT DATE : 2/26/88  E-296
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12034

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRLAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB1T</td>
<td>2/2</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12035

HIGHEST CRITICALITY

FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88   E-298
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12036

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-299
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12037

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-300
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12038

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIPTOFF</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12039

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

ABORT: HDW/FUNC
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-302
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-303
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12041

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ON ORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DE ORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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
SUBSYSTEM: ARCS
MDAC ID: 12043

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAINNG</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: ARCS
MDAC ID: 12044

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-307
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

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

REPORT DATE: 2/26/88  E-308
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-309
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE: 10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM: ARCS</td>
<td>FLIGHT: 3/3</td>
<td></td>
</tr>
<tr>
<td>MDAC ID: 12047</td>
<td>ABORT: 3/3</td>
<td></td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-310
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
MANIFOLD
5) 5, L/R OX & FU ISOL VLVS
6) DIODE
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIR</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-311
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12049

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRLAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-312
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12050

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 MANUALLY OPEN/CLOSE COMMANDS FROM SWITCH STILL OPERABLE. LOSS OF THIS REDUNDANCY MAY CAUSE LOSS OF MISSION.

REFERENCES: ECN 102-8023A

REPORT DATE : 2/26/88 E-313
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-314
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12052

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12053

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12054

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-317
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)

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLIGHT PHASE</td>
</tr>
<tr>
<td>PRELAUNCH:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
</tr>
<tr>
<td>ONORBIT:</td>
</tr>
<tr>
<td>DEORBIT:</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-318
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12056

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-319
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12057

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 SUBSYSTEMS
4) MANIFOLD 5, L/R OX & FU ISOL VLVS
5) DIODE

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-320
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12058

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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
SUBSYSTEM: ARCS
MDAC ID: 12059

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 SUBSYSTEMS
4) MANIFOLD 5, L/R OX & FU ISOL VLVS
5) DIODE

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-322
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12060

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12061

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>RTLS: 3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>TAL: 3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>AOA: 3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>ATO: 3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-324
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-325
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-326
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12064

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: AV BAY 6, PCA 3
PART NUMBER: 56V76A133 J2-B, J2-R

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

EFFECTS/RATIONALE:
LOSE THE GPC CLOSE INHIBIT TO THE GROUND DRIVER. MANUAL INHIBIT AND GPC OPEN INHIBIT STILL OPERABLE. LOSS OF REDUNDANCY TO CLOSE THE ISOLATION VALVE PREVENTS ISOLATION OF A THRUSTER LEAK. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY RESULT IN LOSS OF CREW/VEHICLE.

REFERENCES: ECN 102-8023A

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12065

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-328
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12066

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-329
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12067

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
E-330
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12068

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-331
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12069

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 SUBSYSTEMS
4) MANIFOLD 5, L/R OX & FU ISOL VLVS
5) DIODE

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: ARCS
MDAC ID: 12070

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12071

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

ELECTRICAL COMPONENTS
CONTROLS
PROP STOR & DIST SUBSYSTEMS
MANIFOLD 5, L/R OX & FU ISOL VLVS
DIODE

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12072

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-335
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

MDAC ID: 12073

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-336
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12074

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-337
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12075

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PReLAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONS ORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
E-338
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-339
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12077

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 2/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td></td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-340
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY
SUBSYSTEM: ARCS  HDW/FUNC: 2/1R
MDAC ID: 12078  ABORT: 2/1R

ITEM: L/R HE OX & FU ISOL VLV A OR B SWITCH  HIGHEST CRITICALITY
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) 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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>2/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 ANY FURTHER VALVE MOVEMENT. LOSS OF HARDWARE REDUNDANCY PREVENTS RCS ACTIVITY WHICH MAY LEAD TO 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

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLIGHT PHASE</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>PRELAUNCH:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
</tr>
<tr>
<td>ONORBIT:</td>
</tr>
<tr>
<td>DEORBIT:</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-342
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12080

HIGHEST CRITICITY
HDW/FUNC
FLIGHT: 2/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/2R</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO: 3/3</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-343
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12081

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 E-344
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12082

HIGHEST CRITICALITY

HDW/FUNC

FLIGHT: 2/2

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-345
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 VALV 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 VALV 1/2
5) L/R OX & FU TK ISOL VALV 1/2 SWITCH 16, 19

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-346
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-347
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-348
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL</td>
<td>3/3</td>
</tr>
<tr>
<td>ORBIT</td>
<td>3/3</td>
<td>AOA</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-349
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY
SUBSYSTEM: ARCS  HDW/FUNC
MDAC ID: 12087  FLIGHT: 3/3
            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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>RTLS:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>TAL:</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>AOA:</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>ATO:</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-350
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)

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLIGHT PHASE</td>
</tr>
<tr>
<td>PRELAUNCH:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
</tr>
<tr>
<td>ONORBIT:</td>
</tr>
<tr>
<td>DEORBIT:</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88    E-351
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12089

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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 TK ISOL VLV 1/2
5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABOART</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-352
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12090

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>AGA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-353
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12091

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SFAING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-355
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12093

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-356
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12094

ITEM: DIODE - MANUAL OPEN
FAILURE MODE: FAILS OPEN

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 CONTRAINTS.

REFERENCES: VS70-943099 REV B EO B12; JSC 20923 PCN-1

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

<table>
<thead>
<tr>
<th>SUBSYSTEM</th>
<th>ARCS</th>
<th>MDAC ID</th>
<th>12095</th>
</tr>
</thead>
</table>

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)

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLIGHT PHASE</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>PRELAUNCH:</td>
</tr>
<tr>
<td>LIFTOFF:</td>
</tr>
<tr>
<td>ONSORBIT:</td>
</tr>
<tr>
<td>DEORBIT:</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-358
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12096

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

CRITICALITIES

<table>
<thead>
<tr>
<th>CRITICALITIES</th>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-359
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12097

HIGHEST CRITICALITY

FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-360
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12098

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: ARCS
MDAC ID: 12099

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 2/2</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: AV BAY 6, MCA 3
PART NUMBER: 56V76AI116 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

REPORT DATE : 2/26/88   E-363
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12101

HIGHEST CRITICALITY
HDW/FUNC

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-364
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12102

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 EXCEEDENCE OF LANDING WEIGHT CONSTRAINTS. FAILURE TO CLOSE THE VALVE PREVENTS ISOLATION OF A THRUSTER LEAK.

REFERENCES: VS70-943099 REV B EO B12, DB, CB

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12103

HIGHEST CRITICALITY
FLIGHT: 2/2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-366
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12104

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-367
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 VALV 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 VALV 3/4/5 A OR B
5) L/R OX & FU TK ISOL VALV 3/4/5 A OR B SWITCH 17, 18; 20, 21

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-368
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-369
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12107

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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIPTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONSORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-370
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12108

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: AFT MCA 1

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

REPORT DATE: 2/26/88 E-371
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 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

REPORT DATE: 2/26/88  E-372
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)  HIGHEST CRITICALITY
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-373
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-374
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12112

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12113

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-376
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12114

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-377
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-378
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12116

HIGHEST CRITICALITY
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-379
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12117

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORB:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-380
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12118

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-381
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88       E-382
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12120

HIGHEST CRITICALITY: FLIGHT: 2/2
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88          E-383
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTLS</td>
<td></td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>TAL</td>
<td></td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>AOA</td>
<td></td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>ATO</td>
<td></td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-384
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12122

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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 VALV 3/4/5 A OR B
5) DIODE - MANUAL CLOSE/OPEN INHIBIT
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-385
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12123

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-386
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12124

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-388
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12126

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
E-389
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12127

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

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

REPORT DATE: 2/26/88 E-390
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12128

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-391
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12129

HDW/FUNC

HIGHEST CRITICALITY

ITEM: L/R OX & FU CROSSFEED VLV 1/2 SWITCH 32, 34

FAILMURE 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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-392
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12130

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88     E-393
### INDEPENDENT ORBITER ASSESSMENT
#### ORBITER SUBSYSTEM ANALYSIS WORKSHEET

**DATE:** 10/01/87  
**SUBSYSTEM:** ARCS  
**MDAC ID:** 12131

#### Highest Criticality

<table>
<thead>
<tr>
<th>Flight Phase</th>
<th>HDW/Func</th>
<th>Abort</th>
<th>HDW/Func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 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

**REPORT DATE:** 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12132

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 VALV 1/2
5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88   E-395
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFINING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-396
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12134

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-397
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12135

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-398
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12136

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 VALV 1/2
5) DIODE - GPC OPEN

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12137

HIGHEST CRITICALITY
HDW/FUNC

FAILURES MODE: DIODE - GPC OPEN
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12138

HIGHEST CRITICALITY
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12139

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-402
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12140

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 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

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12141

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAHING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-404
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12142

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88     E-405
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12143

HIGHEST CRITICALITY
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12144

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-407
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12145

HIGHEST CRITICALITY
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-408
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12146

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-409
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-410
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12148

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 2/2
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

LEAD 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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 EXPPELED.

REFERENCES: VS70-943099 REV B EO B12, DD, CD

REPORT DATE: 2/26/88 E-411
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12149

HIGHEST CRITICALITY: HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 07 S33; PNL 07 S35
PART NUMBER: 33V73A7833; 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

REPORT DATE: 2/26/88 E-412
INDEPENDENT ORBITER ASSESSMENT
ORBTER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12150

ITEM: L/R OX & FU CROSSFEED VLV 3/4/5 SWITCH 33, 35
FAILURE MODE: SWITCH SHORTS TO CASE OR POLE TO POLE (WORST CASE)

LEAD ANALYST: D. HARTMAN

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 07 S33; PNL 07 S35
PART NUMBER: 33V73A7S33; S35

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 EOE B12, DD, CD

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12151

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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 3/4/5
5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-414
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12152

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-415
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

VIBRATIONS: 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

REPORT DATE: 2/26/88  E-416
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12154

HIGHEST CRITICALITY
FLIGHT: 3/3
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 3/4/5
5) DIODE - LIMIT SWITCH (CLOSED CIRCUIT)
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

REPORT DATE : 2/26/88 E-417
DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12155

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-418
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>ACA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: ARCS
MDAC ID: 12157

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 VALVE 3/4/5
5) DIODE - GPC OPEN

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: AV BAY 4, MCA 1; AV BAY 6, MCA 3
PART NUMBER: 54V76AII4 - J6-8, J1-7, J6-49; J3-82, J2-83, J3-83

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 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

REPORT DATE: 2/26/88 E-420
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-421
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12159

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-422
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: ARCS
MDAC ID: 12160
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88   E-423
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12161

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-424
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12162

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-425
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12163

HIGHEST CRITICALITY
HDW/FUNC

FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-426
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12164

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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 VALVE 3/4/5
5) DIODE - MANUAL OPEN/CLOSE INHIBIT
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-427
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12165

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB1T</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEOORB1T</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-428
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12166

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-429
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12167

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 E-430
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREL AUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ON ORBIT:</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DE ORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 07 S36
PART NUMBER: 33V73A7S36

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

EFFECTS/RATIONALE:
FAILURE CAUSES CROSSFEEDING OPERATION FROM 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

REPORT DATE: 2/26/88 E-431
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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  E-432
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12170

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-433
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12171

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 2/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-434
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12172

HIGHEST CRITICALITY

HDW/FUNC:

FLIGHT: 3/1R
ABORT: 2/1R

ITEM: MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27
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, L/R OX & FU ISOL VLV
5) MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 07 S22, S27
PART NUMBER: 33V73A7S22, S27

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12173

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 1/1

ITEM: MANIFOLD 1, L/R OX & FU ISOL VLVS
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

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-437
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12175

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-438
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12176

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 VLV
5) MANIFOLD 1, L/R OX & FU ISOL VLV SWITCHES 22, 27
6) 
7) 
8) 
9) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-439
**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**

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 CAPABILITIES 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

**REPORT DATE:** 2/26/88  
**E-440**
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12178

HIGHEST CRITICALITY HDW/.func
FLIGHT: 3/1R
ABORT: 1/1

ITEM: MANIFOLD 2, L/R OX & FU ISOL VLVS 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 VLVS SWITCHES 23, 28
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/func</th>
<th>ABORT</th>
<th>HDW/func</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prelaunch</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 E-441
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

LOCATION: PNL 07 $23, $28
PART NUMBER: 33V73A7S23, $28

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

REPORT DATE: 2/26/88 E-442
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12180

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ON ORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-444
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12182

ITEM: MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29
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 3, L/R OX & FU ISOL VLV
5) MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 07 S24, S29
PART NUMBER: 33V73A7S24, S29

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

REPORT DATE: 2/26/88 E-445
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12183

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 1/1

ITEM: MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29
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 & IST SUBSYSTEM
4) MANIFOLD 3, L/R OX & FU ISOL VLVS
5) MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 07 S24, S29
PART NUMBER: 33V73A7S24, S29

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  E-446
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12184

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 VLV S
5) MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

REPORT DATE: 2/26/88  E-447
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12185

HIGHEST CRITICALITY
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-448
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: ARCS
MDAC ID: 12186
FLIGHT: 3/1R
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 VLV
5) MANIFOLD 3, L/R OX & FU ISOL VLV SWITCHES 24, 29
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
</tr>
<tr>
<td>LIPTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-449
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12187

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 07 S25, S30
PART NUMBER: 33V73A7S25, S30

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

REPORT DATE: 2/26/88  E-450
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 VLVS 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 VLVS SWITCHES 25, 30
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRLAUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORB:</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAF:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-451
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 VLV
5) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
6) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
7) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
8) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
9) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESHOT:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORB:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 MAY RESULT
IN LOSS OF CREW/VEHICLE.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

REPORT DATE : 2/26/88 E-452
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12190
HIGHEST CRITICALITY
FAILURE MODE:
MDAC ID: 12190
ABORT: 3/IR
ITEM: MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
LEAD ANALYST: D. HARTMAN
SUBSYS LEAD: C.D. PRUST
APPLICATION OF THIS THRUSTER LEAK CAUSING LOSS OF CREW/VEHICLE.

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-453
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12191

HIGHEST CRITICALITY
FLIGHT: 3/1R
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 VLV
5) MANIFOLD 4, L/R OX & FU ISOL VLV SWITCHES 25, 30
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-454
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12192

HIGHEST CRITICALITY HDW/Func
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/Func</th>
<th>ABORT</th>
<th>HDW/Func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-455
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12193

HIGHEST CRITICALITY
FLIGHT: 3/3
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 1, L/R OX & FU ISOL VLVS
5) DIODE - LIMIT SWITCH (OPEN CIRCUIT)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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: NO EFFECT. LOSE ISOLATION BETWEEN MANUAL CLOSE AND SWITCH TALKBACK DISPLAY.

REFERENCES: VS70-943099 REV B EO B12; JSC SYSTEMS HANDBOOK

REPORT DATE: 2/26/88  E-456
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12194

HIGHEST CRITICALITY

FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-457
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-458
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-459
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12197

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88

E-460
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12198

HIGHEST CRITICALITY
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 1, L/R OX & FU ISOL VLVS
5) DIODE - GPC OPEN

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88   E-461
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12199

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-462
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12231

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-463
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12200

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

CRITICALITIES

<table>
<thead>
<tr>
<th>PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-464
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12201

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-466
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12203

HIGHEST CRITICALITY
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-467
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>ITEM:</th>
<th>DIODE - MANUAL OPEN/CLOSE INHIBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAILURE MODE</td>
<td>FAILS OPEN</td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-468
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  HIGHEST CRITICALITY HDW/FUNC  FLIGHT: 3/3
SUBSYSTEM: ARCS  ABORT: 3/3
MDAC ID: 12206

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-470
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12207

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88   E-471
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12208

HIGHEST CRITICALITY

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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&a1152H HANDBOOK

REPORT DATE: 2/26/88 E-472
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-473
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12210

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABOERT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-474
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-475
INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12212  

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  
E-476
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

10/01/DATE:
SUBSYSTEM: ARCS
MDAC ID: 12213

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 2, L/R OX & FU ISOL VLVS
5) DIODE - GPC CLOSE
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: AFT MCA #1
PART NUMBER: J3-17, J2-55; J2-99, J3-2

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

REPORT DATE: 2/26/88 E-477
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12214

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>ARCS</td>
<td>FLIGHT:</td>
<td>3/3</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>12215</td>
<td>ABORT:</td>
<td>3/3</td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REDUNDANCY SCREENS: A [ ]  
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

REPORT DATE : 2/26/88  
E-479
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-480
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12217

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-481
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-482
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12219

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88   E-483
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12220

HIGHEST CRITICALITY
HDW/FUNC

FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-484
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12221

HIGHEST CRITICALITY: Hdw/Func
FLIGHT: 3/1R
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 2, L/R OX & FU ISOL VLVS
5) DIODE - MANUAL OPEN/CLOSE INHIBIT
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-485
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12222

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

HDW/FUNC CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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. loose "POWER OFF" INHIBIT TO THE OPEN RELAY.

REFERENCES: VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

REPORT DATE: 2/26/88 E-486
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-487
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12224

HIGHEST CRITICALITY
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-488
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12225

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12226

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>RTLS: 3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-490
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12228

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/1R

ITEM: DIODE - GPC CLOSE
FAILURE MODE: FAILS OPEN

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

BREAKDOWN HIERARCHY:
1) LECTRICAL 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)  

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-492
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12229

HIGHEST CRITICALITY
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12230

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12232

HIGHEST CRITICALITY
HDW/FUNC

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 3, L/R OX & FU ISOL VLVS
5) DIODE - MANUAL OPEN

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>A:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88

E-495
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12233

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-496
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12234

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88   E-497
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12235

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12236

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-499
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-500
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12238

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

ITEM: DIODE - MANUAL CLOSE/OPEN INHIBIT
FAILURES 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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-502
**INDEPENDENT ORBITER ASSESSMENT**

**ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>ARCS</td>
<td>HDW/FUNC</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>12240</td>
<td>FLIGHT: 3/3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABORT: 3/3</td>
</tr>
</tbody>
</table>

**ITEM:** DIODE - LIMIT SWITCH (OPEN CIRCUIT)

**FAILURE MODE:** FAILS OPEN

**LEAD ANALYST:** D. HARTMAN

**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) 

**CRITICALITIES**

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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

**REPORT DATE:** 2/26/88  E-503
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12241

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-504
**INDEPENDENT ORBITER ASSESSMENT**

**ORBITER SUBSYSTEM ANALYSIS WORKSHEET**

<table>
<thead>
<tr>
<th>DATE</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM</td>
<td>ARCS</td>
<td>FLIGHT:</td>
<td>3/3</td>
</tr>
<tr>
<td>MDAC ID</td>
<td>12242</td>
<td>ABORT:</td>
<td>3/3</td>
</tr>
</tbody>
</table>

**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)

**CRITICALITIES**

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:  3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AGA:  3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:  3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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

**REPORT DATE:** 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12243

HIGHEST CRITICALITY

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 4, L/R OX & FU ISOL VLVS
5) DIODE - LIMIT SWITCH (CLOSE CIRCUIT)
6) 
7) 
8) 
9)

ELECTRICAL COMPONENTS
CONTROLS
PROP STOR & DIST SUBSYSTEM
MANIFOLD 4, L/R OX & FU ISOL VLVS
DIODE - LIMIT SWITCH (CLOSE CIRCUIT)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12244

HIGHEST CRITICALITY  HDW/FUNC
FLIGHT:  3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 112; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK

REPORT DATE: 2/26/88  E-507
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12245

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-508
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
HIGHEST CRITICALITY  
HDW/FUNC  
FLIGHT: 3/1R  
ABORT: 2/1R

SUBSYSTEM: ARCS  
MDAC ID: 12246

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-509
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12247

HIGHEST CRITICALITY

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-510
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12248

HIGHEST CRITICALITY HDW/FUNC
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 4, L/R OX & FU ISOL VLVS
5) DIODE - MANUAL OPEN
6) 7) 8) 9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORB:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAFING:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12249

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REduDANCY 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

REPORT DATE: 2/26/88   E-512
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12250

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     | 3/1R   | 3/1R
LIFTOFF:           3/1R     | 3/1R   | 3/1R
ONORBIT:           3/1R     | 3/1R   | 3/1R
DEORBIT:           3/1R     | 3/1R   | 3/1R
LANDING/SAFING:    3/1R     |         |


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

REPORT DATE: 2/26/88 E-513
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  FTA
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)

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.

REFERENCES:  VS70-943099 REV B EO B12; JSC 11174, SPACE SHUTTLE
SYSTEMS HANDBOOK

REPORT DATE:  2/26/88  E-514
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12252

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-515
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12253

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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)

ELECTRICAL COMPONENTS
CONTROLS
PROP STOR & DIST SUBSYSTEM
MANIFOLD 4, L/R OX & FU ISOL VLVS
DIODE - MANUAL OPEN/CLOSE INHIBIT

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-516
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-517
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12255

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 LEFT VERNIER. 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

REPORT DATE: 2/26/88  E-519
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIPTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
ORBIZER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12258

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-521
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) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-522
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12260

ITEM: RJDA1B L1/L5/R1 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 L1/L5/R1, RJDA1B
5) RJDA1B L1/L5/R1 MANIFOLD LOGIC SWITCH 3

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: PNL 015 S3
PART NUMBER: 33V73A15S3

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

EFFECTS/RATIONALE:
IF SWITCH SHORS TO CASE THE ASSOCIATED 1 AMP FUSE WILL BLOW.
LOSS OF CURRENT ACROSS CONTACT SET 5, 6 IS WORST CASE. THIS CAUSES LOSS OF ONE ELECTRICAL PATH TO TURN ON ELECTRONIC, BITE, AND DRIVER POWER FOR MANIFOLD 1 JETS AND CAUSES LOSS OF LEFT VERNIERS. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 2, 3, AND 4.
NO REDUNDANCY FOR LEFT VERNIER. 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

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: ARCS FLIGHT: 3/1R
MDAC ID: 12261 ABORT: 1/1

ITEM: RJDA1B L1/R1 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 L1/R1, RJDA1B
5) RJDA1B L1/R1 MANIFOLD DRIVER SWITCH 4
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/2</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 015 S4
PART NUMBER: 33V73A15S4

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

EFFECTS/RATIONALE:
LOSE CAPABILITY TO TURN ON MANIFOLD 1 DRIVER POWER. THIS CAUSES LOSS OF JETS ON MANIFOLD 1. REDUNDANCY PROVIDED BY JETS ON MANIFOLDS 2, 3, 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 E-524
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12262

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/33</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12263

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: ARCS
MDAC ID: 12264

ITEM: RJDA1B L1/R1 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 L1/R1, RJDA1B
5) RJDA1B L1/R1 MANIFOLD DRIVER SWITCH 4
6) 
7) 
8) 
9) 

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/2</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 015 S4
PART NUMBER: 33V73A15S4

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

EFFECTS/RATIONALE:
DURING RE-ENTRY, MANIFOLD 1 JETS ARE USED FOR VEHICLE CONTROL.
REDUNDANCY PROVIDED BY MANIFOLD 3 JETS. LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF CONTROL OF THE VEHICLE. 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 E-527
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87        HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: ARCS        FLIGHT: 3/1R
MDAC ID: 12265        ABORT: 1/1

ITEM: RJDA1B L1/R1 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 L1/R1, RJDA1B
5) RJDA1B L1/R1 MANIFOLD DRIVER SWITCH 4

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 015 S4
PART NUMBER: 33V73A15S4

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 CAUSE LOSS OF MANIFOLD 1 JETS. JET REDUNDANCY PROVIDED WITH MANIFOLDS 2, 3, AND 4. LOSS OF ALL REDUNDANCY MAY CAUSE LOSS OF CONTROL OF VEHICLE DURING 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 E-528
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-529
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12267

HIGHEST CRITICALITY

FLIGHT: 3/3
ABORT: 3/3

ITEM: RJDA1A L2/R2 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 L2/R2, RJDA1A
5) RJDA1A L2/R2 MANIFOLD LOGIC SWITCH 3

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-530
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12268

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-532
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12270

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRLAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-533
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12271

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-534
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12272

ITEM: RJDA1A L2/R2 MANIFOLD DRIVER SWITCH 4
FAILURE MODE: SWITCH FAILS SHORT (WORST CASE)

LEAD ANALYST: D. HARTMAN
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: ARCS
MDAC ID: 12273

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-536
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12274

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 EXPELLED 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

REPORT DATE: 2/26/88   E-537
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12275

HIGHEST CRITICALITY
HDW/.Func

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/Func</th>
<th>ABORT</th>
<th>HDW/Func</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 E-538
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12276

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 2/2
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-539
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-540
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>ACA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88  E-541
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12279

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-542
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12280

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 PROVIDE 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

REPORT DATE: 2/26/88 E-543
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12281

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) ...

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:  1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:  3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:  3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFINING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 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 E-544
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12282

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12283

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESHUTTLE</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONBOARD</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEBOARD</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-546
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87  SUBSYSTEM: ARCS  MDAC ID: 12284

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R  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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-547
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 E-548
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12286

HIGHEST CRITICALITY
HDW/FUNC

FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12287

HIGHEST CRITICALITY

FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
SUBSYSTEM: ARCS
MDAC ID: 12288

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12289

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td></td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-552
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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  E-553
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12291

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-554
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12292

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-555
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) ELECTRICAL COMPONENTS
2) CONTROLS
3) THRUSTER SUBSYSTEM
4) MANIFOLD L4/R4, RJDA2A
5) RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-556
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 PROVING -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

REPORT DATE : 2/26/88  E-557
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12295

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 1/1

ITEM: RJDA2A L4/R4 MANIFOLD DRIVER SWITCH 6

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 DRIVER SWITCH 6

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 014 S6

PART NUMBER: 33V73A14S6

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 AMPS). THIS WILL CAUSE LOSS OF ONE ELECTRICAL PATH FOR 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. FAILURE DURING RTLS/TAL PREVENTS 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 E-558
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-559
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12297

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88

E-560
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

ITEM: MANIFOLD 1, JETS HEATER CONTROL SWITCH 9
FAILURE MODE: SWITCH FAILS SHORT ACROSS CONTACT SET (WORST CASE)

LEAD ANALYST: D. HARTMAN

SUBSYSTEM: ARCS
FLIGHT: 3/2R
MDAC ID: 12298
ABORT: 3/2R

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) THERMAL CONTROL SUBSYSTEM
4) MANIFOLD 1, JETS
5) MANIFOLD 1, JETS HEATER CONTROL SWITCH 9

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12299

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO</td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-562
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

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

MDAC ID: 12300

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
E-563
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-564
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
MDAC ID: 12302

SUBSYSTEM: ARCS

HIGHEST CRITICALITY
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-565
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12303

HIGHEST CRITICALITY HDW/FUNC
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

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


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 REUNDANCY 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

REPORT DATE: 2/26/88 E-566
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12304

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-567
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12305

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
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) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
7) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
8) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10
9) MANIFOLD 2, JETS HEATER CONTROL SWITCH 10

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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. PROPPELLANTS 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

REPORT DATE: 2/26/88 E-568
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12306

HIGHEST CRITICALITY HDW/FUNC

FLIGHT: 3/2R

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


LOCATION: PNL 14 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

REPORT DATE: 2/26/88 E-569
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12307

HIGHEST CRITICALITY

HDW/FUNC

FLIGHT: 3/3
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)

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

REPORT DATE: 2/26/88 E-570
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
FAILRE 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

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

REPORT DATE : 2/26/88  E-571
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

HIGHEST CRITICALITY

HDW/FUNC

FLIGHT: 3/3

ABORT: 3/3

SUBSYSTEM: ARCS

MDAC ID: 12309

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RTLS: 3/3
TAL: 3/3
AOA: 3/3
ATO: 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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12310

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

ITEM: MANIFOLD 3, JETS HEATER CONTROL SWITCH 11
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 3, JETS
5) MANIFOLD 3, JETS HEATER CONTROL SWITCH 11

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-573
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12311

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-574
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12312

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/3
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-575
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 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) THERMAL CONTROL SUBSYSTEM
4) MANIFOLD 4, JETS
5) MANIFOLD 4, JETS HEATER CONTROL SWITCH 12

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3 RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3 TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3 ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>


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 OPERATIONS THUS MISSION OBJECTIVES.

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  E-576
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12314

HIGHEST CRITICALITY
FLIGHT: 3/3
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORKBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-578
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12316

ITEM: MANIFOLD 5, JETS HEATER CONTROL SWITCH 13
FAILURE MODE: SWITCH FAILS OPEN (WORST CASE)

LEAD ANALYST: D. HARTMAN

BREAKDOWN HIERARCHY:
1) ELECTRICAL COMPONENTS
2) CONTROLS
3) THERMAL CONTROL SUBSYSTEM
4) MANIFOLD 5, JETS
5) MANIFOLD 5, JETS HEATER CONTROL SWITCH 13

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: PNL A14 S13
PART NUMBER: 36V73A14S13

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

EFFECTS/RATIONALE:
PROPPELLANTS IN JETS ON MANIFOLD 5 MAY FREEZE CAUSING LOSS OF JETS. NO REDUNDANCY PROVIDED BY 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

REPORT DATE: 2/26/88 E-579
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12317

HIGHEST CRITICALITY
FLIGHT: 3/3
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-580
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-581
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/3</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/3</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DATE:</th>
<th>10/01/87</th>
<th>HIGHEST CRITICALITY</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSYSTEM:</td>
<td>ARCS</td>
<td>FLIGHT:</td>
<td>2/2</td>
</tr>
<tr>
<td>MDAC ID:</td>
<td>12320</td>
<td>ABORT:</td>
<td>2/2</td>
</tr>
</tbody>
</table>

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRelaunch:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>Liftoff:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>Onorbit:</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>Deorbit:</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>Landing/Safing:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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. PROPELLANS 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

REPORT DATE: 2/26/88   E-583
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 OLI
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 OLI
6)
7)
8)
9)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>1/1</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>1/1</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88    E-584
INDEPENDENT ORBITER ASSESSMENT

ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12322

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
E-585
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12323
HIGHEST CRITICALITY
FLIGHT: 3/IR
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-586
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12324

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 E-587
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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>/</td>
<td>RTLS:</td>
<td>/</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>/</td>
<td>TAL:</td>
<td>/</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>/</td>
<td>AOA:</td>
<td>/</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>/</td>
<td>ATO:</td>
<td>/</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-588
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS
MDAC ID: 12326

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) THRUSTER, AFT
5) JET DRIVER (PRIMARY-ALL)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>/</td>
<td>RTLS:</td>
<td>/</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>/</td>
<td>TAL:</td>
<td>/</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>/</td>
<td>AOA:</td>
<td>/</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>/</td>
<td>ATO:</td>
<td>/</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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-PROPPELLANT VALVES ALLOWING FIRING. CREW MUST ISOLATE PROPPELLANT BY CLOSING ASSOCIATED MANIFOLD. INADVERTENT FIRING DURING ANY MISSION PHASE MAY CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: VS70-942099 REV D EO D01

REPORT DATE: 2/26/88 E-589
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

SUBSYSTEM: ARCS

MDAC ID: 12327

HIGHEST CRITICALITY HDW/FUNC FLIGHT: / 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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>/</td>
<td>RTLS:</td>
<td>/</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>/</td>
<td>TAL:</td>
<td>/</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>/</td>
<td>AOA:</td>
<td>/</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>/</td>
<td>ATO:</td>
<td>/</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-590
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87

HIGHEST CRITICALITY HDW/FUNC

FLIGHT: 3/2R

ABORT: 3/2R

SUBSYSTEM: ARCS

MDAC ID: 12338

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-591
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12328

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)

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>/</td>
<td>RTLS:</td>
<td>/</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>/</td>
<td>TAL:</td>
<td>/</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>/</td>
<td>AOA:</td>
<td>/</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>/</td>
<td>ATO:</td>
<td>/</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88 E-592
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12329

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>2/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>2/1R</td>
<td>ATO:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-593
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12330

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-594
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12331

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-595
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12332

HIGHEST CRITICALITY
HDW/FUNC

FLIGHT: 2/2
ABORT: 1/1

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 TK ISOL 1/2
5) MICROSWITCH

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 1/1</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 1/1</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 2/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCATION: 51V42LV227, 51V42LV228, 51V42LV217, 51V42LV218
PART NUMBER: J1-F (FOUR MICROSWITCHES)

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

EFFECTS/RATIONALE:
SWITCH FAILURE ACROSS THE CLOSE CONTACTS WILL NOT ALLOW THE VALVE TO BE CLOSED. THIS PREVENTS CROSSFEED OPERATION THUS LOSS OF MISSION OPERATIONS. INABILITY TO CROSSFEED MAY CAUSE INCOMPLETE OMS ABORT DUMP.

REFERENCES: VS70-942099 REV D EO D01

REPORT DATE: 2/26/88 E-596
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12333

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/2R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-597
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 VALVE 1/2
5) DIODE

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td>3/1R</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-598
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/1R</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/1R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/1R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88     E-599
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-600
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12337

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-601
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12339

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-602
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12340

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12341

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-604
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12342

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 3/1R</td>
<td></td>
</tr>
<tr>
<td>ONORB:</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/1R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12343

HIGHEST CRITICALITY hdw/fnc

FLIGHT: 3/1R
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>3/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/1R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-606
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>3/3</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL:</td>
<td>3/3</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA:</td>
<td>3/3</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO:</td>
<td>2/2</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 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

REPORT DATE: 2/26/88  E-608
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12346

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AGA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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 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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12347

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)

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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12348

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12349

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-612
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12350

HIGHEST CRITICALITY
HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12351

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAVING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-614
INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET  

DATE: 10/01/87  
SUBSYSTEM: ARCS  
MDAC ID: 12352  

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  

CRITICALITIES  

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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  

REPORT DATE: 2/26/88  
E-615
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12353

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88

E-616
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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREADUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
E-617
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12355

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88 E-618
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:        FAILURE MODE: DIODE  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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-619
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12357

ITEM: DIODE
FAILRE 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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88 E-620
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12358

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88  E-621
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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 2/1R</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/1R</td>
<td>TAL: 2/1R</td>
<td></td>
</tr>
<tr>
<td>ON ORBIT</td>
<td>3/2R</td>
<td>AOA: 3/1R</td>
<td></td>
</tr>
<tr>
<td>DE ORBIT</td>
<td>3/1R</td>
<td>ATO: 3/2R</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE : 2/26/88  E-622
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12360

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

CRITICALITIES

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>P relaunch</td>
<td>3/3</td>
<td>RTLS:</td>
<td>2/1R</td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/1R</td>
<td>TAL:</td>
<td>2/1R</td>
</tr>
<tr>
<td>ON ORBIT:</td>
<td>3/2R</td>
<td>AOA:</td>
<td>3/1R</td>
</tr>
<tr>
<td>DE ORBIT:</td>
<td>3/1R</td>
<td>ATO:</td>
<td>3/2R</td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

REPORT DATE: 2/26/88
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12361

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH:</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF:</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT:</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT:</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING:</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE: 2/26/88  E-624
INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/01/87
SUBSYSTEM: ARCS
MDAC ID: 12362

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

<table>
<thead>
<tr>
<th>FLIGHT PHASE</th>
<th>HDW/FUNC</th>
<th>ABORT</th>
<th>HDW/FUNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELAUNCH</td>
<td>3/3</td>
<td>RTLS: 3/3</td>
<td></td>
</tr>
<tr>
<td>LIFTOFF</td>
<td>3/3</td>
<td>TAL: 3/3</td>
<td></td>
</tr>
<tr>
<td>ONORBIT</td>
<td>2/2</td>
<td>AOA: 3/3</td>
<td></td>
</tr>
<tr>
<td>DEORBIT</td>
<td>3/3</td>
<td>ATO: 2/2</td>
<td></td>
</tr>
<tr>
<td>LANDING/SAFING</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

REPORT DATE : 2/26/88 E-625
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.

F-1
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-2F-101010-1</td>
<td>FRCS-100</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101013-1</td>
<td>FRCS-105</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101020-3</td>
<td>FRCS-103</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>HDW 1</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101020-4</td>
<td>FRCS-104</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>HDW 1</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101030-1</td>
<td>FRCS-10004X</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101030-2</td>
<td>FRCS-111</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101050-1</td>
<td>FRCS-144</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101060-1</td>
<td>FRCS-10001X</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101060-2</td>
<td>FRCS-10007X</td>
<td>2/1R</td>
<td>P</td>
<td>N</td>
<td>A</td>
<td>HDW 5</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101060-3</td>
<td>FRCS-141</td>
<td>3/1R</td>
<td>F</td>
<td>N</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101060-4</td>
<td>FRCS-141A</td>
<td>3/1R</td>
<td>P</td>
<td>N</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101060-5</td>
<td>FRCS-140A</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101070-1</td>
<td>FRCS-101</td>
<td>2/1R</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101070-2</td>
<td>FRCS-102</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-101080-1</td>
<td>FRCS-159</td>
<td>2/1R</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101080-2</td>
<td>FRCS-160</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101090-1</td>
<td>FRCS-130</td>
<td>3/1R</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101090-2</td>
<td>FRCS-131</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101091-1</td>
<td>FRCS-109</td>
<td>3/1R</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101091-2</td>
<td>FRCS-110</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101095-1</td>
<td>FRCS-119</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101095-2</td>
<td>FRCS-120</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>HDW 2</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-101095-3</td>
<td>FRCS-10005X</td>
<td>2/1R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>HDW 2, 8</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102106-1</td>
<td>FRCS-138</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-102108-1</td>
<td>FRCS-124</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-102110-1</td>
<td>FRCS-158</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>HDW 1</td>
<td>X</td>
</tr>
</tbody>
</table>

APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - FORWARD HARDWARE

(SEE LEGEND CODE)
<table>
<thead>
<tr>
<th>IDENTIFIERS</th>
<th>NASA</th>
<th>IOA RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMEA NUMBER</td>
<td>I OA</td>
<td>CRIT SCREENS</td>
</tr>
<tr>
<td>NASA ASSESSMENT NUMBER</td>
<td>HW/F</td>
<td>A B C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FMEA NUMBER</th>
<th>NASA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-2F-102110-1</td>
<td>FRCS-162</td>
<td>3/IR</td>
<td>P P P</td>
<td>2/IR</td>
<td>P P P</td>
<td>HDW 1</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102110-2</td>
<td>FRCS-157</td>
<td>3/IR</td>
<td>P NA P</td>
<td>2/IR</td>
<td>P P P</td>
<td>HDW 1</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102110-3</td>
<td>FRCS-10012X</td>
<td>3/3</td>
<td>1/1</td>
<td>HDW 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-102110-1</td>
<td>FRCS-147</td>
<td>1/1</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-102120-1</td>
<td>FRCS-148</td>
<td>3/IR</td>
<td>P P P</td>
<td>2/IR</td>
<td>P P F</td>
<td>HDW 1</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102120-2</td>
<td>FRCS-150</td>
<td>3/IR</td>
<td>P P P</td>
<td>2/IR</td>
<td>P P P</td>
<td>HDW 1</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102120-3</td>
<td>FRCS-149</td>
<td>3/IR</td>
<td>P NA P</td>
<td>2/IR</td>
<td>P P P</td>
<td>HDW 1</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102150-1</td>
<td>FRCS-126</td>
<td>2/IR</td>
<td>F F P</td>
<td>2/IR</td>
<td>F F P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102150-2</td>
<td>FRCS-127</td>
<td>3/3</td>
<td>3/3</td>
<td>HDW 4</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-102170-1</td>
<td>FRCS-174</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-102170-2</td>
<td>FRCS-173</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P NA P</td>
<td>HDW 2</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-102170-3</td>
<td>FRCS-177A</td>
<td>1/1</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-111110-1</td>
<td>FRCS-125</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-111110-3</td>
<td>FRCS-128</td>
<td>1/1</td>
<td></td>
<td>HDW 6</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-121308-1</td>
<td>FRCS-179</td>
<td>1/1</td>
<td></td>
<td>HDW 6</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-121310-1</td>
<td>FRCS-10116X</td>
<td>3/3</td>
<td>1/1</td>
<td>HDW 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-121310-2</td>
<td>FRCS-181</td>
<td>3/1R</td>
<td>F P P</td>
<td>1/1</td>
<td>HDW 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>03-2F-121310-3</td>
<td>FRCS-10015X</td>
<td>3/1R</td>
<td>F P P</td>
<td>3/2R</td>
<td>F P P</td>
<td>HDW 3</td>
<td>X</td>
</tr>
<tr>
<td>03-2F-121320-1</td>
<td>FRCS-197</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-121320-1</td>
<td>FRCS-197A</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-131310-1</td>
<td>FRCS-193</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-131310-2</td>
<td>FRCS-192</td>
<td>2/2</td>
<td>1/1</td>
<td>HDW 2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDENTIFIERS</td>
<td>NASA</td>
<td>IOA</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>OTHER</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>-----</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>HW/F</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>HW/F</td>
<td>A</td>
</tr>
<tr>
<td>03-2F-131310-2</td>
<td>FRCS-195</td>
<td>2/2</td>
<td>1/1</td>
<td>HDW 2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-131310-4</td>
<td>FRCS-198</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NONE</td>
<td>FRCS-10002X</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-10003X</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10006X</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10008X</td>
<td>3/1R</td>
<td>F N A</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10011X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10013X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10014X</td>
<td>2/1R</td>
<td>P</td>
<td>N A</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-10016X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10017X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10018X</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10019X</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-10042X</td>
<td>1/1</td>
<td>HDW 4</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-103A</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-106</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-108</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-113</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-114</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-115</td>
<td>3/2R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-116</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-129</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-139</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-140</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-146</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-149A</td>
<td>3/1R</td>
<td>P</td>
<td>N A</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-151A</td>
<td>3/1R</td>
<td>P</td>
<td>N A</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-178</td>
<td>2/2</td>
<td>HDW 4</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-182</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-183</td>
<td>2/1R</td>
<td>F</td>
<td>P</td>
<td>P</td>
<td>HDW 4</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>FRCS-190</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-191</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-194</td>
<td>1/1</td>
<td>HDW 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-4
# APPENDIX F

**NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - AFT HARDWARE**

<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS A B C</th>
<th>CRIT SCREENS A B C</th>
<th>OTHER (SEE LEGEND CODE)</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-2A-201010-1</td>
<td>ARCS-199</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201013-1</td>
<td>ARCS-204</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201020-1</td>
<td>ARCS-206</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201020-2</td>
<td>ARCS-203</td>
<td>2/1R</td>
<td>P P P</td>
<td>3/1R P P</td>
<td>HDW 1</td>
</tr>
<tr>
<td>03-2A-201030-1</td>
<td>ARCS-10022X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201030-2</td>
<td>ARCS-210</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201050-1</td>
<td>ARCS-245</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201060-1</td>
<td>ARCS-10027X</td>
<td>1/1</td>
<td></td>
<td>1/1</td>
<td>HDW 5</td>
</tr>
<tr>
<td>03-2A-201060-2</td>
<td>ARCS-10025X</td>
<td>2/1R</td>
<td>P NA P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201060-3</td>
<td>ARCS-242</td>
<td>3/1R</td>
<td>F NA P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201060-4</td>
<td>ARCS-242A</td>
<td>3/1R</td>
<td>P NA P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201070-1</td>
<td>ARCS-200</td>
<td>2/1R</td>
<td>F F P</td>
<td>2/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201070-2</td>
<td>ARCS-201</td>
<td>2/1R</td>
<td>F F P</td>
<td>2/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201080-1</td>
<td>ARCS-254</td>
<td>2/1R</td>
<td>F F P</td>
<td>2/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201080-2</td>
<td>ARCS-256</td>
<td>2/1R</td>
<td>F F P</td>
<td>2/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201080-3</td>
<td>ARCS-257</td>
<td>2/1R</td>
<td>F F P</td>
<td>2/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201090-1</td>
<td>ARCS-229</td>
<td>3/1R</td>
<td>F F P</td>
<td>3/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201090-2</td>
<td>ARCS-230</td>
<td>3/1R</td>
<td>F F P</td>
<td>3/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201091-1</td>
<td>ARCS-208</td>
<td>3/1R</td>
<td>F F P</td>
<td>3/1R F F P</td>
<td>HDW 4</td>
</tr>
<tr>
<td>03-2A-201091-2</td>
<td>ARCS-217</td>
<td>3/1R</td>
<td>F F P</td>
<td>3/1R F F P</td>
<td>HDW 4</td>
</tr>
</tbody>
</table>

**ARCS Code Numbers**

- ARCS-10027X
- ARCS-10025X
- ARCS-242
- ARCS-242A
- ARCS-241A
- ARCS-200
- ARCS-201
- ARCS-254
- ARCS-256
- ARCS-268
- ARCS-272
- ARCS-276
- ARCS-280
- ARCS-284
- ARCS-255
- ARCS-257
- ARCS-269
- ARCS-273
- ARCS-277
- ARCS-281
- ARCS-285
- ARCS-229
- ARCS-233
- ARCS-235
- ARCS-230
- ARCS-234
- ARCS-236
- ARCS-208
- ARCS-216
- ARCS-220
- ARCS-243
- ARCS-209
- ARCS-217
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS</th>
<th>CRIT SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-2A-201091-2</td>
<td>ARCS-221</td>
<td>3/3</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-244</td>
<td>3/3</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201095-1</td>
<td>ARCS-218</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201095-2</td>
<td>ARCS-219</td>
<td>2/1R</td>
<td>P F F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-201095-3</td>
<td>ARCS-10023X</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202108-1</td>
<td>ARCS-223</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202110-1</td>
<td>ARCS-251</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td>03-2A-202110-2</td>
<td>ARCS-10029X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202110-3</td>
<td>ARCS-10030X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202111-1</td>
<td>ARCS-260</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202111-2</td>
<td>ARCS-261</td>
<td>2/2</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202111-3</td>
<td>ARCS-10033X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202112-1</td>
<td>ARCS-248</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202112-2</td>
<td>ARCS-259</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202112-3</td>
<td>ARCS-286</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202112-4</td>
<td>ARCS-266</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202112-5</td>
<td>ARCS-270</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202112-6</td>
<td>ARCS-274</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202112-7</td>
<td>ARCS-278</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202120-1</td>
<td>ARCS-10035X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202120-2</td>
<td>ARCS-267</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td>03-2A-202120-3</td>
<td>ARCS-271</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td>03-2A-202120-4</td>
<td>ARCS-275</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td>03-2A-202120-5</td>
<td>ARCS-279</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td>03-2A-202140-1</td>
<td>ARCS-283</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202140-2</td>
<td>ARCS-282</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202140-3</td>
<td>ARCS-10036X</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202150-1</td>
<td>ARCS-286A</td>
<td>1/1</td>
<td>F F F</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>03-2A-202150-2</td>
<td>ARCS-225</td>
<td>2/1R</td>
<td>F F P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202150-3</td>
<td>ARCS-231</td>
<td>2/1R</td>
<td>F F P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-202150-4</td>
<td>ARCS-237</td>
<td>2/1R</td>
<td>F F P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-211110-1</td>
<td>ARCS-222</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-211110-2</td>
<td>ARCS-227</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-211110-3</td>
<td>ARCS-239</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221308-1</td>
<td>ARCS-288</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221310-1</td>
<td>ARCS-290</td>
<td>3/1R</td>
<td>F P P</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>03-2A-221310-2</td>
<td>ARCS-294</td>
<td>3/1R</td>
<td>F P P</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>03-2A-221310-3</td>
<td>ARCS-296</td>
<td>3/1R</td>
<td>F P P</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>03-2A-221310-4</td>
<td>ARCS-298</td>
<td>3/1R</td>
<td>F P P</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER ISSUE</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>03-2A-221310-3</td>
<td>ARCS-10138X</td>
<td>3/3</td>
<td>1/1</td>
<td>HDW 1</td>
<td></td>
</tr>
<tr>
<td>03-2A-221310-4</td>
<td>ARCS-293</td>
<td>3/1R F P P</td>
<td>3/1R F P P</td>
<td>HDW 2, 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-295</td>
<td>3/1R F P P</td>
<td>3/1R F P P</td>
<td>HDW 2, 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-297</td>
<td>3/1R F P P</td>
<td>3/1R F P P</td>
<td>HDW 2, 7</td>
<td></td>
</tr>
<tr>
<td>03-2A-221312-1</td>
<td>ARCS-306</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221313-1</td>
<td>ARCS-306A</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-231310-1</td>
<td>ARCS-302</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-305</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-307</td>
<td>1/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-231310-3</td>
<td>ARCS-301</td>
<td>3/1R F P P</td>
<td>1/1</td>
<td>HDW 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-304</td>
<td>3/1R F P P</td>
<td>1/1</td>
<td>HDW 2</td>
<td></td>
</tr>
<tr>
<td>NONE</td>
<td>ARCS-10020X</td>
<td>2/1R P F F</td>
<td>HDW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10021X</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10024X</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10026X</td>
<td>3/1R F NA P</td>
<td>HDW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10028X</td>
<td>3/1R P F P</td>
<td>HDW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10031X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10032X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10034X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10037X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10038X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10039X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10040X</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10041X</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-10043X</td>
<td>1/1</td>
<td>HDW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-202A</td>
<td>3/1R P F P</td>
<td>HDW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-205</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-207</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-213</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-214</td>
<td>3/2R P F P</td>
<td>HDW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-215</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-224</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-228</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-240</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-241</td>
<td>2/1R P F P</td>
<td>HDW 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-247</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-249</td>
<td>3/1R P F P</td>
<td>HDW 4, 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-258</td>
<td>2/2</td>
<td>HDW 4, 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-264</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-287</td>
<td>2/2</td>
<td>HDW 4, 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-289</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-291</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-292</td>
<td>3/1R P F P</td>
<td>HDW 4, 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-299</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-300</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-303</td>
<td>1/1</td>
<td>HDW 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-7
<table>
<thead>
<tr>
<th>NASA IDENTIFIERS</th>
<th>NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - FORWARD EPD&amp;C</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
</tr>
<tr>
<td>03-2F-103340-2</td>
<td>FRCS-1197</td>
</tr>
<tr>
<td></td>
<td>FRCS-1198</td>
</tr>
<tr>
<td></td>
<td>FRCS-1199</td>
</tr>
<tr>
<td></td>
<td>FRCS-1200</td>
</tr>
<tr>
<td></td>
<td>FRCS-1201</td>
</tr>
<tr>
<td></td>
<td>FRCS-1202</td>
</tr>
<tr>
<td></td>
<td>FRCS-1203</td>
</tr>
<tr>
<td></td>
<td>FRCS-1204</td>
</tr>
<tr>
<td></td>
<td>FRCS-1205</td>
</tr>
<tr>
<td></td>
<td>FRCS-1206</td>
</tr>
<tr>
<td></td>
<td>FRCS-1207</td>
</tr>
<tr>
<td></td>
<td>FRCS-1208</td>
</tr>
<tr>
<td>03-2F-103345-1</td>
<td>FRCS-1290</td>
</tr>
<tr>
<td></td>
<td>FRCS-1291</td>
</tr>
<tr>
<td></td>
<td>FRCS-1292</td>
</tr>
<tr>
<td></td>
<td>FRCS-1296</td>
</tr>
<tr>
<td></td>
<td>FRCS-1298</td>
</tr>
<tr>
<td>03-2F-103345-2</td>
<td>FRCS-1293</td>
</tr>
<tr>
<td></td>
<td>FRCS-1295</td>
</tr>
<tr>
<td></td>
<td>FRCS-1297</td>
</tr>
<tr>
<td></td>
<td>FRCS-1299</td>
</tr>
<tr>
<td></td>
<td>FRCS-1300</td>
</tr>
<tr>
<td>03-2F-103350-1</td>
<td>FRCS-373</td>
</tr>
<tr>
<td></td>
<td>FRCS-374</td>
</tr>
<tr>
<td></td>
<td>FRCS-375</td>
</tr>
<tr>
<td></td>
<td>FRCS-376</td>
</tr>
<tr>
<td></td>
<td>FRCS-377</td>
</tr>
<tr>
<td></td>
<td>FRCS-378</td>
</tr>
<tr>
<td></td>
<td>FRCS-379</td>
</tr>
<tr>
<td></td>
<td>FRCS-380</td>
</tr>
<tr>
<td>03-2F-103350-2</td>
<td>FRCS-841</td>
</tr>
<tr>
<td></td>
<td>FRCS-842</td>
</tr>
<tr>
<td></td>
<td>FRCS-843</td>
</tr>
<tr>
<td></td>
<td>FRCS-844</td>
</tr>
<tr>
<td></td>
<td>FRCS-845</td>
</tr>
<tr>
<td></td>
<td>FRCS-846</td>
</tr>
<tr>
<td></td>
<td>FRCS-847</td>
</tr>
<tr>
<td></td>
<td>FRCS-848</td>
</tr>
<tr>
<td>03-2F-103350-3</td>
<td>FRCS-863</td>
</tr>
<tr>
<td></td>
<td>FRCS-864</td>
</tr>
<tr>
<td></td>
<td>FRCS-865</td>
</tr>
<tr>
<td></td>
<td>FRCS-866</td>
</tr>
<tr>
<td></td>
<td>FRCS-867</td>
</tr>
<tr>
<td></td>
<td>FRCS-868</td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>03-2F-103350-3</td>
<td>FRCS-869</td>
</tr>
<tr>
<td></td>
<td>FRCS-870</td>
</tr>
<tr>
<td></td>
<td>FRCS-871</td>
</tr>
<tr>
<td></td>
<td>FRCS-872</td>
</tr>
<tr>
<td></td>
<td>FRCS-873</td>
</tr>
<tr>
<td></td>
<td>FRCS-874</td>
</tr>
<tr>
<td></td>
<td>FRCS-875</td>
</tr>
<tr>
<td></td>
<td>FRCS-876</td>
</tr>
<tr>
<td></td>
<td>FRCS-877</td>
</tr>
<tr>
<td></td>
<td>FRCS-878</td>
</tr>
<tr>
<td>03-2F-103360-1</td>
<td>FRCS-381</td>
</tr>
<tr>
<td></td>
<td>FRCS-382</td>
</tr>
<tr>
<td></td>
<td>FRCS-385</td>
</tr>
<tr>
<td></td>
<td>FRCS-386</td>
</tr>
<tr>
<td>03-2F-103370-1</td>
<td>FRCS-849</td>
</tr>
<tr>
<td></td>
<td>FRCS-850</td>
</tr>
<tr>
<td></td>
<td>FRCS-851</td>
</tr>
<tr>
<td></td>
<td>FRCS-852</td>
</tr>
<tr>
<td></td>
<td>FRCS-853</td>
</tr>
<tr>
<td></td>
<td>FRCS-854</td>
</tr>
<tr>
<td></td>
<td>FRCS-855</td>
</tr>
<tr>
<td></td>
<td>FRCS-856</td>
</tr>
<tr>
<td></td>
<td>FRCS-857</td>
</tr>
<tr>
<td></td>
<td>FRCS-858</td>
</tr>
<tr>
<td></td>
<td>FRCS-859</td>
</tr>
<tr>
<td></td>
<td>FRCS-860</td>
</tr>
<tr>
<td></td>
<td>FRCS-861</td>
</tr>
<tr>
<td></td>
<td>FRCS-862</td>
</tr>
<tr>
<td>03-2F-121314-1</td>
<td>FRCS-1137</td>
</tr>
<tr>
<td></td>
<td>FRCS-1139</td>
</tr>
<tr>
<td></td>
<td>FRCS-1141</td>
</tr>
<tr>
<td></td>
<td>FRCS-1143</td>
</tr>
<tr>
<td>03-2F-121314-2</td>
<td>FRCS-1136</td>
</tr>
<tr>
<td></td>
<td>FRCS-1138</td>
</tr>
<tr>
<td></td>
<td>FRCS-1140</td>
</tr>
<tr>
<td></td>
<td>FRCS-1142</td>
</tr>
<tr>
<td>03-2F-121315-1</td>
<td>FRCS-1147</td>
</tr>
<tr>
<td></td>
<td>FRCS-1149</td>
</tr>
<tr>
<td></td>
<td>FRCS-1151</td>
</tr>
<tr>
<td></td>
<td>FRCS-1153</td>
</tr>
<tr>
<td>03-2F-121315-2</td>
<td>FRCS-1146</td>
</tr>
<tr>
<td></td>
<td>FRCS-1148</td>
</tr>
<tr>
<td></td>
<td>FRCS-1150</td>
</tr>
<tr>
<td></td>
<td>FRCS-1152</td>
</tr>
<tr>
<td>03-2F-121316-1</td>
<td>FRCS-1209</td>
</tr>
<tr>
<td></td>
<td>FRCS-1211</td>
</tr>
<tr>
<td></td>
<td>FRCS-1213</td>
</tr>
<tr>
<td>03-2F-121316-2</td>
<td>FRCS-1210</td>
</tr>
</tbody>
</table>

F-9
<table>
<thead>
<tr>
<th>NASA ID/ASSESSMENT NUMBER</th>
<th>CRIT SCREENS</th>
<th>HWIF A</th>
<th>HWIF B</th>
<th>HWIF C</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-2F-121317-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-121317-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-121317-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2F-121317-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDENTIFIERS</td>
<td>NASA</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>------------------------</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>FMEA NUMBER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2026 -1</td>
<td>FRCS-11084X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2026 -2</td>
<td>FRCS-11081X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2028 -1</td>
<td>FRCS-11085X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2028 -2</td>
<td>FRCS-11086X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2029 -1</td>
<td>FRCS-11090X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2029 -2</td>
<td>FRCS-11091X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2030 -1</td>
<td>FRCS-11095X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2030 -2</td>
<td>FRCS-11096X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2032 -1</td>
<td>FRCS-11003X</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2032 -2</td>
<td>FRCS-11006X</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2033 -1</td>
<td>FRCS-11107X</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
</tr>
<tr>
<td>05-6KF-2034 -1</td>
<td>FRCS-11109X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2035 -1</td>
<td>FRCS-11115X</td>
<td>3/1R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
</tr>
<tr>
<td>05-6KF-2035 -1</td>
<td>FRCS-11149X</td>
<td>3/1P P P</td>
<td>3/1P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KF-2035 -2</td>
<td>FRCS-11116X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11117X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11118X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11126X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11127X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11128X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11136X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11137X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11138X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11146X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td>FRCS-11147X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KF-2036 -1</td>
<td>FRCS-11120X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td></td>
<td>FRCS-11124X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td></td>
<td>FRCS-11130X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td></td>
<td>FRCS-11134X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td></td>
<td>FRCS-11140X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td></td>
<td>FRCS-11144X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td></td>
<td>FRCS-11150X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td></td>
<td>FRCS-11154X</td>
<td>3/1P P P</td>
<td>2/1P P P</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td>05-6KF-2036 -2</td>
<td>FRCS-11121X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11122X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11123X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11131X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11132X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11133X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11141X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11142X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11143X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11151X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11152X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11153X</td>
<td>3/1P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KF-2037 -1</td>
<td>FRCS-11160X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11162X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11164X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11165X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11167X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11169X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11170X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11172X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11174X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11175X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11177X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>FRCS-11179X</td>
<td>3/2P P P</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KF-2037 -2</td>
<td>FRCS-11161X</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11163X</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11166X</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-12
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KF-2037 -2</td>
<td>FRCS-11168X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11177X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11173X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11176X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11178X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2038 -1</td>
<td>FRCS-11185X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11187X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11189X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2038 -2</td>
<td>FRCS-11186X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11188X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2041 -1</td>
<td>FRCS-11155X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11159X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2041 -2</td>
<td>FRCS-11156X</td>
<td>3/2R P P P 3/3 EPD&amp;C 2 X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11157X</td>
<td>3/2R P P P 3/3 EPD&amp;C 2 X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11158X</td>
<td>3/2R P P P 3/3 EPD&amp;C 2 X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2042 -1</td>
<td>FRCS-11180X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11182X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11184X</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2042 -2</td>
<td>FRCS-11181X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11183X</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2076 -1</td>
<td>FRCS-342</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-343</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-344</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-345</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-346</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2077 -1</td>
<td>FRCS-347</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-348</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-349</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-350</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-351</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-352</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-353</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-354</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-355</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2078 -1</td>
<td>FRCS-356</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-357</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2081 -1</td>
<td>FRCS-502</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-503</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-506</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-510</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-511</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-512</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-513</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2082 -1</td>
<td>FRCS-504</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-505</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-507</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-508</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-509</td>
<td>3/3</td>
<td></td>
</tr>
</tbody>
</table>

Other Issues: (SEE LEGEND CODE)
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT H/F A B C</th>
<th>SCREENS A B C</th>
<th>CRIT H/F A B C</th>
<th>SCREENS A B C</th>
<th>OTHER (SEE LEGEND CODE)</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KF-2083 -1</td>
<td>FRCS-496</td>
<td>3/1R P F P</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2084 -1</td>
<td>FRCS-514</td>
<td>3/1R P F P</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2084 -2</td>
<td>FRCS-515</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2085 -1</td>
<td>FRCS-522</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2086 -1</td>
<td>FRCS-520</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2087 -1</td>
<td>FRCS-720</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2088 -1</td>
<td>FRCS-724</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMEA NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2088 -1</td>
<td>FRCS-739</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-740</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-741</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-742</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-743</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-744</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-745</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-752</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-753</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-754</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-755</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-756</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-757</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-758</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-759</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-766</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-768</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-770</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-772</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2089 -1</td>
<td>FRCS-718</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>3/2R</td>
<td>P</td>
</tr>
<tr>
<td>FRCS-732</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>FRCS-746</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>FRCS-760</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>05-6KF-2089 -2</td>
<td>FRCS-719</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-733</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-747</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-761</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2090 -1</td>
<td>FRCS-11008X</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>3/2R</td>
<td>P</td>
</tr>
<tr>
<td>FRCS-11009X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2091 -1</td>
<td>FRCS-11012X</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td>FRCS-11013X</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-11014X</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>FRCS-11015X</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2092 -1</td>
<td>FRCS-765</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-767</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-769</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-771</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-773</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2093 -1</td>
<td>FRCS-11010X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-11011X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2093 -1</td>
<td>FRCS-1012</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1013</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1044</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1045</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-980</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-981</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-996</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-997</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-15
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS H/W/F A/B/C</th>
<th>CRIT SCREENS H/W/F A/B/C</th>
<th>OTHER (SEE LEGEND CODE)</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KF-2094 -1</td>
<td>FRCS-1000</td>
<td>3/1R</td>
<td>P/F/P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1016</td>
<td>3/1R</td>
<td>P/F/P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1028</td>
<td>3/1R</td>
<td>P/F/P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1036</td>
<td>3/1R</td>
<td>P/F/P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-988</td>
<td>3/1R</td>
<td>P/F/P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2094 -2</td>
<td>FRCS-1001</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1017</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1029</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1037</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-989</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2095 -1</td>
<td>FRCS-1010</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1011</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-978</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-979</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-994</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-995</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2096 -1</td>
<td>FRCS-1002</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1003</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1024</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1025</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1030</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1031</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1038</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1039</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-990</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-991</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2097 -1</td>
<td>FRCS-1006</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1007</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1008</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1009</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1020</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1021</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1022</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1023</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1040</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1041</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1042</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1043</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-986</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-987</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-992</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-993</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2098 -1</td>
<td>FRCS-1004</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1005</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1014</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1015</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1018</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1019</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS HW/F A B C</td>
<td>CRIT SCREENS HW/F A B C</td>
<td>OTHER (SEE LEGEND CODE)</td>
<td>ISSUE</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2098-1</td>
<td>FRCS-1026</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1027</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1032</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1033</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1046</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1047</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1048</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1049</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-982</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-983</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-984</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-985</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-998</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-999</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2099-1</td>
<td>FRCS-1237</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1238</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1239</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1240</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1241</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1242</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1243</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1244</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1245</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1246</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2100-1</td>
<td>FRCS-1225</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1226</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1233</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1234</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2101-1</td>
<td>FRCS-1221</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1223</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1231</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1235</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2101-2</td>
<td>FRCS-1222</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1224</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1232</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1236</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2109-1</td>
<td>FRCS-1050</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1051</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1054</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1055</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2110-1</td>
<td>FRCS-1052</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1053</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1056</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1057</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2111-1</td>
<td>FRCS-1034</td>
<td>3/2R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2113A-1</td>
<td>FRCS-11032X</td>
<td>3/2R</td>
<td>P P P</td>
<td>2/2</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2113A-2</td>
<td>FRCS-11033X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2126-1</td>
<td>FRCS-472</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
</tr>
</tbody>
</table>

---

F-17
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KF-2126 -1</td>
<td>FRCS-478</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2126 -2</td>
<td>FRCS-473</td>
<td>2/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2126A -1</td>
<td>FRCS-479</td>
<td>2/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2126A -2</td>
<td>FRCS-474</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2127 -1</td>
<td>FRCS-477</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2127 -2</td>
<td>FRCS-481</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2127A -1</td>
<td>FRCS-483</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -1</td>
<td>FRCS-486</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -2</td>
<td>FRCS-488</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -1</td>
<td>FRCS-492</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -2</td>
<td>FRCS-494</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -1</td>
<td>FRCS-704</td>
<td>3/1R</td>
<td>P NA</td>
<td>3/1R</td>
<td>P NA</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -2</td>
<td>FRCS-708</td>
<td>3/1R</td>
<td>P NA</td>
<td>3/1R</td>
<td>P NA</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -1</td>
<td>FRCS-712</td>
<td>3/1R</td>
<td>P NA</td>
<td>3/1R</td>
<td>P NA</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -2</td>
<td>FRCS-716</td>
<td>3/1R</td>
<td>P NA</td>
<td>3/1R</td>
<td>P NA</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -1</td>
<td>FRCS-705</td>
<td>2/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 2,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -2</td>
<td>FRCS-709</td>
<td>2/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 2,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -1</td>
<td>FRCS-713</td>
<td>2/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 2,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -2</td>
<td>FRCS-717</td>
<td>2/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 2,4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -1</td>
<td>FRCS-702</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128 -2</td>
<td>FRCS-706</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -1</td>
<td>FRCS-710</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -2</td>
<td>FRCS-714</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128B -1</td>
<td>FRCS-703</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128B -2</td>
<td>FRCS-707</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -1</td>
<td>FRCS-711</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2128A -2</td>
<td>FRCS-715</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2130 -1</td>
<td>FRCS-972</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2130 -2</td>
<td>FRCS-974</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2130 -1</td>
<td>FRCS-976</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2130 -2</td>
<td>FRCS-973</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2131 -1</td>
<td>FRCS-975</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2131 -2</td>
<td>FRCS-977</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2131 -1</td>
<td>FRCS-1217</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2131 -2</td>
<td>FRCS-1218</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>05-6KF-2131</td>
<td>FRCS-1220</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2151</td>
<td>FRCS-387</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2153</td>
<td>FRCS-879</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2154</td>
<td>FRCS-879A</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2155</td>
<td>FRCS-880</td>
<td>2/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2155</td>
<td>FRCS-882</td>
<td>2/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2155</td>
<td>FRCS-883</td>
<td>2/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2156</td>
<td>FRCS-880A</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2156</td>
<td>FRCS-881</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2156</td>
<td>FRCS-882</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2156</td>
<td>FRCS-883</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2156</td>
<td>FRCS-11017X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>1</td>
</tr>
<tr>
<td>05-6KF-2156</td>
<td>FRCS-11016X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2157</td>
<td>FRCS-11192X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2158</td>
<td>FRCS-11193X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2158</td>
<td>FRCS-11194X</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>6</td>
</tr>
<tr>
<td>05-6KF-2176</td>
<td>FRCS-308</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2176</td>
<td>FRCS-312</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2176</td>
<td>FRCS-309</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2176</td>
<td>FRCS-313</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2176A</td>
<td>FRCS-310</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2176A</td>
<td>FRCS-314</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2176A</td>
<td>FRCS-311</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2176A</td>
<td>FRCS-315</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2177</td>
<td>FRCS-11018X</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P W A P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2177</td>
<td>FRCS-11019X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>2</td>
</tr>
<tr>
<td>05-6KF-2178</td>
<td>FRCS-11020X</td>
<td>3/2R</td>
<td>P P P</td>
<td>2/2</td>
<td></td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2178</td>
<td>FRCS-11021X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>2</td>
</tr>
<tr>
<td>05-6KF-2179</td>
<td>FRCS-885</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2179</td>
<td>FRCS-889</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2179</td>
<td>FRCS-893</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2179</td>
<td>FRCS-904</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2179</td>
<td>FRCS-886</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>2</td>
</tr>
<tr>
<td>05-6KF-2179</td>
<td>FRCS-890</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>2</td>
</tr>
<tr>
<td>05-6KF-2180</td>
<td>FRCS-901</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>2</td>
</tr>
<tr>
<td>05-6KF-2180</td>
<td>FRCS-902</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2180</td>
<td>FRCS-895</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2180</td>
<td>FRCS-897</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2181</td>
<td>FRCS-903</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>4</td>
</tr>
<tr>
<td>05-6KF-2181</td>
<td>FRCS-899</td>
<td>3/1R</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>IOA RECOMMENDATIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------</td>
<td>--------------</td>
<td>----------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2182 -2</td>
<td>FRCS-900</td>
<td>3/1R P P P</td>
<td>EPD&amp;C 1 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2183 -1</td>
<td>FRCS-905</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2183 -2</td>
<td>FRCS-906</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 2 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2201 -1</td>
<td>FRCS-336</td>
<td>3/3</td>
<td>EPD&amp;C 1 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2201 -2</td>
<td>FRCS-337</td>
<td>3/1R P P P</td>
<td>EPD&amp;C 1 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2202 -1</td>
<td>FRCS-330</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2202 -2</td>
<td>FRCS-331</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2202A -1</td>
<td>FRCS-328</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2202A -2</td>
<td>FRCS-329</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2206 -1</td>
<td>FRCS-460</td>
<td>3/3</td>
<td>EPD&amp;C 1 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2206 -2</td>
<td>FRCS-462</td>
<td>3/3</td>
<td>EPD&amp;C 1 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2207 -1</td>
<td>FRCS-464</td>
<td>3/3</td>
<td>EPD&amp;C 1 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2207 -2</td>
<td>FRCS-466</td>
<td>3/3</td>
<td>EPD&amp;C 1 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2208 -1</td>
<td>FRCS-668</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 2 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2208 -2</td>
<td>FRCS-670</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 2 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2210 -1</td>
<td>FRCS-11024X</td>
<td>3/1R P F P</td>
<td>EPD&amp;C 2 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2210 -2</td>
<td>FRCS-11025X</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 4 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2210A -1</td>
<td>FRCS-11022X</td>
<td>3/1R P F P</td>
<td>EPD&amp;C 2 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2210A -2</td>
<td>FRCS-11023X</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 4 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2211 -1</td>
<td>FRCS-11030X</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 4 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2211 -2</td>
<td>FRCS-11031X</td>
<td>3/1R P F P</td>
<td>EPD&amp;C 2 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2212 -1</td>
<td>FRCS-11028X</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 4 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifiers</td>
<td>IOA Assessment Number</td>
<td>CRIT</td>
<td>Screens A B C</td>
<td>CRIT</td>
<td>Screens A B C</td>
<td>Other (See Legend Code)</td>
<td>Issue</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------</td>
<td>------</td>
<td>---------------</td>
<td>------</td>
<td>---------------</td>
<td>--------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>NASA FMEA Number</td>
<td>FRCS-11029X</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P N A P</td>
<td>EPD&amp;C 3, 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2212</td>
<td>FRCS-11026X</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/1R</td>
<td>P N A P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2213</td>
<td>FRCS-11027X</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2214</td>
<td>FRCS-947</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2214</td>
<td>FRCS-949</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2214</td>
<td>FRCS-951</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2214</td>
<td>FRCS-953</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2214</td>
<td>FRCS-956</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-948</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-950</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-952</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-954</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-955</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1156</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1158</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1160</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1162</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1164</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1166</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1168</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1170</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1172</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1174</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1176</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1178</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2215</td>
<td>FRCS-1180</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1157</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1159</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1161</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1163</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1165</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1167</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1169</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1171</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1173</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1175</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1177</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-1179</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-957</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2220</td>
<td>FRCS-958</td>
<td>3/2R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2224</td>
<td>FRCS-11034X</td>
<td>3/2R</td>
<td>P F P</td>
<td>2/2</td>
<td></td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2224</td>
<td>FRCS-11035X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2225</td>
<td>FRCS-316</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2225</td>
<td>FRCS-318</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2225</td>
<td>FRCS-317</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2225</td>
<td>FRCS-319</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2225</td>
<td>FRCS-320</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2225</td>
<td>FRCS-322</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2225</td>
<td>FRCS-321</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
</tbody>
</table>

F-21
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>I CRIT</th>
<th>SCREENS</th>
<th>NASA I CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KF-2252 -2</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2252 -3</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/1R P WA P</td>
<td>EPD&amp;C</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2253 -1</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253 -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253A -1</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253A -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253B -1</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/1R P WA P</td>
<td>EPD&amp;C</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>05-6KF-2253B -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253C -1</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253C -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253D -1</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253D -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253E -1</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253E -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253F -1</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2253F -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254 -1</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254 -2</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254A -1</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HW/F A B C</td>
<td>HW/F A B C</td>
<td>(SEE LEGEND CODE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254A-1</td>
<td>FRCS-440</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-458</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254A-2</td>
<td>FRCS-439</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-441</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-457</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254B-1</td>
<td>FRCS-434</td>
<td>3/2R P P P</td>
<td>3/1R P N A P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-436</td>
<td>3/2R P P P</td>
<td>3/1R P N A P</td>
<td>EPD&amp;C 6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254B-2</td>
<td>FRCS-435</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-437</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254C-1</td>
<td>FRCS-426</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-428</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254C-2</td>
<td>FRCS-427</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-429</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254D-1</td>
<td>FRCS-432</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-450</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-452</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254D-2</td>
<td>FRCS-433</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-451</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-453</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254E-1</td>
<td>FRCS-444</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-454</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254E-2</td>
<td>FRCS-445</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-455</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254F-1</td>
<td>FRCS-430</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-448</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2254F-2</td>
<td>FRCS-431</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-449</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255-1</td>
<td>FRCS-572</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-578</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-594</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-600</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-616</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-622</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-638</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-644</td>
<td>2/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255-2</td>
<td>FRCS-573</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-579</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-595</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-601</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-617</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-623</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-639</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-645</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255A-1</td>
<td>FRCS-584</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-586</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-606</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-608</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-628</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDENTIFIERS</td>
<td>NASA</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER ISSUE</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td></td>
<td></td>
<td></td>
<td>OTHER ISSUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255A-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-630</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255A-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-585</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-587</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255B-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-574</td>
<td>3/2R P P P</td>
<td>3/1R P NAP</td>
<td>EPD&amp;C 6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-596</td>
<td>3/2R P P P</td>
<td>3/1R P NAP</td>
<td>EPD&amp;C 6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-618</td>
<td>3/2R P P P</td>
<td>3/1R P NAP</td>
<td>EPD&amp;C 6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-640</td>
<td>3/2R P P P</td>
<td>3/1R P NAP</td>
<td>EPD&amp;C 6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255B-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-575</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255C-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-570</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-592</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-614</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-636</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255C-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-571</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-593</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-615</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-637</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255D-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-588</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-610</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-632</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-654</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255D-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-589</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-611</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-633</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-655</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255E-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-576</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-598</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-620</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-642</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255E-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-577</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-599</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-621</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-643</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255F-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-568</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-590</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-612</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-634</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255F-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRC5-569</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2255F-2</td>
<td>FRCS-591</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-613</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-635</td>
<td>3/1R P F P</td>
<td>2/1R P F P</td>
<td>EPD&amp;C 3,4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257-1</td>
<td>FRCS-11036X</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257-2</td>
<td>FRCS-11037X</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257A-1</td>
<td>FRCS-11038X</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257A-2</td>
<td>FRCS-11039X</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257B-1</td>
<td>FRCS-11040X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257B-2</td>
<td>FRCS-11041X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257C-1</td>
<td>FRCS-11042X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257C-2</td>
<td>FRCS-11043X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257D-1</td>
<td>FRCS-11044X</td>
<td>3/2R P P P</td>
<td>3/1R P NA P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257D-2</td>
<td>FRCS-11045X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257E-1</td>
<td>FRCS-11046X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257E-2</td>
<td>FRCS-11047X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257F-1</td>
<td>FRCS-11048X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257F-2</td>
<td>FRCS-11049X</td>
<td>3/2R P P P</td>
<td>3/1R P NA P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257G-1</td>
<td>FRCS-11050X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257G-2</td>
<td>FRCS-11051X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257H-1</td>
<td>FRCS-11052X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257H-2</td>
<td>FRCS-11053X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257I-1</td>
<td>FRCS-11054X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257I-2</td>
<td>FRCS-11055X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257J-1</td>
<td>FRCS-11056X</td>
<td>3/2R P P P</td>
<td>3/1R P NA P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257J-2</td>
<td>FRCS-11057X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257K-1</td>
<td>FRCS-11058X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257K-2</td>
<td>FRCS-11059X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257L-1</td>
<td>FRCS-11060X</td>
<td>3/2R P P P</td>
<td>3/1R P NA P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257L-2</td>
<td>FRCS-11061X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257M-1</td>
<td>FRCS-11062X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257M-2</td>
<td>FRCS-11063X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257N-1</td>
<td>FRCS-11064X</td>
<td>3/2R P P P</td>
<td>3/1R P NA P</td>
<td>EPD&amp;C 4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257N-2</td>
<td>FRCS-11065X</td>
<td>3/2R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257O-1</td>
<td>FRCS-11066X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257O-2</td>
<td>FRCS-11067X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257P-1</td>
<td>FRCS-11068X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2257P-2</td>
<td>FRCS-11069X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2258-1</td>
<td>FRCS-11070X</td>
<td>3/2R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2258-2</td>
<td>FRCS-11071X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2258-3</td>
<td>FRCS-11072X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2259-1</td>
<td>FRCS-11073X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2259-2</td>
<td>FRCS-11074X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2259A-1</td>
<td>FRCS-11075X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2259A-2</td>
<td>FRCS-11076X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OTHER (SEE LEGEND CODE)**

- EPD&C 3,4
- EPD&C 2
- EPD&C 1
- EPD&C 4
- EPD&C 5

**ISSUE**

- X

---

**Legend Code**

- CRIT SCREENS
- HW/F A B C
- P P P
- P F P
- F P P

---

**Identifiers**

- 05-6KF-2255F-2
- 05-6KF-2255F-2
- 05-6KF-2257-1
- 05-6KF-2257-2
- 05-6KF-2257A-1
- 05-6KF-2257A-2
- 05-6KF-2257B-1
- 05-6KF-2257B-2
- 05-6KF-2257C-1
- 05-6KF-2257C-2
- 05-6KF-2257D-1
- 05-6KF-2257D-2
- 05-6KF-2257E-1
- 05-6KF-2257E-2
- 05-6KF-2257F-1
- 05-6KF-2257F-2
- 05-6KF-2257G-1
- 05-6KF-2257G-2
- 05-6KF-2257H-1
- 05-6KF-2257H-2
- 05-6KF-2258-1
- 05-6KF-2258-2
- 05-6KF-2258-3
- 05-6KF-2259-1
- 05-6KF-2259-2
- 05-6KF-2259A-1
- 05-6KF-2259A-2
<table>
<thead>
<tr>
<th>IDENTIFIERS</th>
<th>NASA</th>
<th>IOA</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NASA</td>
<td>IOA</td>
<td>FMEA NUMBER</td>
<td>ASSESSMENT NUMBER</td>
<td>HW/F</td>
<td>A B C</td>
<td>HW/F</td>
<td>A B C</td>
</tr>
<tr>
<td>05-6KF-2259-2</td>
<td>FRC5-918</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2259-2</td>
<td>FRC5-924</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2259-2</td>
<td>FRC5-930</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2259-2</td>
<td>FRC5-940</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2260-1</td>
<td>FRC5-909</td>
<td>3/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td>05-6KF-2260-1</td>
<td>FRC5-915</td>
<td>3/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td>05-6KF-2260-1</td>
<td>FRC5-921</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2260-1</td>
<td>FRC5-927</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2260-1</td>
<td>FRC5-943</td>
<td>3/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td>05-6KF-2260-2</td>
<td>FRC5-910</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2260-2</td>
<td>FRC5-916</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2260-2</td>
<td>FRC5-922</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2260-2</td>
<td>FRC5-928</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2260-2</td>
<td>FRC5-944</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-1</td>
<td>FRC5-1121X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-1</td>
<td>FRC5-1122X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-1</td>
<td>FRC5-933</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-1</td>
<td>FRC5-935</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-2</td>
<td>FRC5-934</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-2</td>
<td>FRC5-936</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-2</td>
<td>FRC5-324</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-2</td>
<td>FRC5-326</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2266-2</td>
<td>FRC5-327</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-1</td>
<td>FRC5-580</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-1</td>
<td>FRC5-582</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-1</td>
<td>FRC5-602</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-1</td>
<td>FRC5-604</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-1</td>
<td>FRC5-624</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-1</td>
<td>FRC5-626</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-646</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-648</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-581</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-583</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-603</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-605</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-627</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-647</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2268-2</td>
<td>FRC5-649</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2269-1</td>
<td>FRC5-1105X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2269-1</td>
<td>FRC5-11058X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2269-2</td>
<td>FRC5-11057X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2270-1</td>
<td>FRC5-1121X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2270-1</td>
<td>FRC5-945</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2270-2</td>
<td>FRC5-946</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2271-1</td>
<td>FRC5-937</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2271 -2</td>
<td>FRCS-938</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2280 -1</td>
<td>FRCS-11076X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2280 -2</td>
<td>FRCS-11077X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KF-2302 -1</td>
<td>FRCS-11195X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KF-2303 -1</td>
<td>FRCS-11197X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NONE</td>
<td>FRCS-1035</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11072X</td>
<td>3/1R</td>
<td>P N A P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11073X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11074X</td>
<td>3/1R</td>
<td>P N A P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11075X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11078X</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11079X</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11196X</td>
<td>3/2R</td>
<td>P F P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11198X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11199X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11200X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-111201X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11202X</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11203X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11204X</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11205X</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11206X</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11207X</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11208X</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11209X</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11210X</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11213X</td>
<td>2/1R</td>
<td>P F P</td>
<td>2/1R</td>
<td></td>
<td>EPD&amp;C</td>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11214X</td>
<td>2/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11215X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11216X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-11217X</td>
<td>2/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td>EPD&amp;C</td>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1132</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1133</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1134</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1144</td>
<td>3/2R</td>
<td>P F P</td>
<td>3/2R</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1145</td>
<td>3/2R</td>
<td>P F P</td>
<td>3/2R</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1154</td>
<td>3/2R</td>
<td>P F P</td>
<td>3/2R</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1155</td>
<td>3/2R</td>
<td>P F P</td>
<td>3/2R</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1227</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1228</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1229</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1230</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FRCS-1301</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td></td>
<td>EPD&amp;C</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

---

F-27
### APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS - AFT EPD&C

<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS</th>
<th>CRIT SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-2A-203350-1</td>
<td>ARCS-1414</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1415</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1416</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1417</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1418</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1419</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1420</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1421</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-203350-2</td>
<td>ARCS-1860</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1861</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1862</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1863</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1864</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1865</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1866</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1867</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-203350-3</td>
<td>ARCS-2168</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2169</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2170</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2171</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2172</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2173</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2174</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2175</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-203360-1</td>
<td>ARCS-1422</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1423</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1424</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1425</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-203365-1</td>
<td>ARCS-1868</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1869</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1870</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1871</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-203365-2</td>
<td>ARCS-2176</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2177</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2178</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2179</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221314-1</td>
<td>ARCS-2280</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2282</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2283</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2285</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2289</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2291</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221314-2</td>
<td>ARCS-2281</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2284</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT HW/F</td>
<td>SCREENS A B C</td>
<td>CRIT HW/F</td>
<td>SCREENS A B C</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>-----------</td>
<td>---------------</td>
<td>-----------</td>
<td>---------------</td>
</tr>
<tr>
<td>03-2A-221214-2</td>
<td>ARCS-2290</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221315-1</td>
<td>ARCS-2292</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2294</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2296</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221315-2</td>
<td>ARCS-2298</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2299</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221316-1</td>
<td>ARCS-2316</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2317</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2318</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221316-2</td>
<td>ARCS-2319</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2320</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2321</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221317-1</td>
<td>ARCS-2322</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-2A-221317-2</td>
<td>ARCS-2323</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2001-1</td>
<td>ARCS-1362</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1363</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1364</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1365</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2003-1</td>
<td>ARCS-1524</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1525</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2004-1</td>
<td>ARCS-1526</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1527</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2005-1</td>
<td>ARCS-1535</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1536</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1537</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1538</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2006-1</td>
<td>ARCS-12001X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12002X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2007-1</td>
<td>ARCS-2008</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2009</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2011</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2013</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2017</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2018</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2020</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2022</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2008-1</td>
<td>ARCS-2004</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2005</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2010</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2012</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2015</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2016</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2019</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2021</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2009-1</td>
<td>ARCS-2006</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2007</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2014</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2015</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2016</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2019</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2021</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2006</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2007</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2014</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER ISSUE</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>H/F A B C</td>
<td>H/F A B C</td>
<td>(SEE LEGEND CODE)</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2010-I</td>
<td>ARCS-2314</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2011-I</td>
<td>ARCS-2310</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2311</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2312</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2313</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2014-I</td>
<td>ARCS-1531</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1532</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1533</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1534</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2016-I</td>
<td>ARCS-1528</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1529</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1530</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2026-I</td>
<td>ARCS-12076X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2026-2</td>
<td>ARCS-12077X</td>
<td>2/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12078X</td>
<td>2/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12079X</td>
<td>2/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12080X</td>
<td>2/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2028-I</td>
<td>ARCS-12081X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12085X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2028-2</td>
<td>ARCS-12082X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12083X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12084X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2029-I</td>
<td>ARCS-12102X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12106X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2029-2</td>
<td>ARCS-12103X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12104X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12105X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2030-I</td>
<td>ARCS-12172X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12176X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12177X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12181X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12182X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12186X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12187X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12191X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2030-2</td>
<td>ARCS-12173X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12174X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12175X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12178X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12179X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12180X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12183X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12184X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12185X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12188X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12189X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12190X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2032-1</td>
<td>ARCS-12003X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER ISSUE</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2032-1</td>
<td>ARCS-12007X</td>
<td>3/1R P P P</td>
<td>3/1R P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2032-2</td>
<td>ARCS-12004X</td>
<td>3/1R P P P</td>
<td>3/1R P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12005X</td>
<td>3/1R P P P</td>
<td>3/1R P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12006X</td>
<td>3/1R P P P</td>
<td>3/1R P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2035-1</td>
<td>ARCS-12256X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12259X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12260X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12266X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12269X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12270X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12274X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12279X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12280X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12286X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C 6</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2035-2</td>
<td>ARCS-12257X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12258X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12267X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12268X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12277X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12278X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12287X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12288X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12289X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2036-1</td>
<td>ARCS-12261X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12264X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12265X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12271X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12274X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12275X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12281X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12284X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12285X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12291X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12294X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12295X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2036-2</td>
<td>ARCS-12262X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12263X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12272X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12273X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12282X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12283X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12292X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12293X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2037-1</td>
<td>ARCS-12296X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12298X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12300X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12301X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>05-6KA-2037-1</td>
<td>ARCS-12303X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12305X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12306X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12308X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12310X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12311X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12313X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12315X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2037-2</td>
<td>ARCS-12297X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12299X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12302X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12304X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12307X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12309X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12312X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12314X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2039-1</td>
<td>ARCS-12125X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12128X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12129X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12146X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12149X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12150X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2039-2</td>
<td>ARCS-12126X</td>
<td>3/1R P F P</td>
<td>2/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12127X</td>
<td>3/1R P F P</td>
<td>2/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12147X</td>
<td>3/1R P F P</td>
<td>2/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12148X</td>
<td>3/1R P F P</td>
<td>2/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2040-1</td>
<td>ARCS-12167X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12171X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2040-2</td>
<td>ARCS-12168X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12169X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12170X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2042-1</td>
<td>ARCS-12316X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12318X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12320X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2042-2</td>
<td>ARCS-12317X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12319X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2076-1</td>
<td>ARCS-1366</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1367</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1368</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1369</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1370</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1371</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1382</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1383</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1384</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1385</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1386</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1387</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-32
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IDENTIFIERS</th>
<th>NASA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KA-2077-1</td>
<td>ARCS-1372</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1373</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1374</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1375</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1378</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1379</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1380</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1381</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1382</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1383</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1384</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1385</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1386</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1387</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2078-1</td>
<td>ARCS-1376</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1377</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1392</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1393</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2081-1</td>
<td>ARCS-1399</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1591</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1603</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1604</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1605</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2082-1</td>
<td>ARCS-1597</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1598</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1601</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1602</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2083-1</td>
<td>ARCS-1393</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1595</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1599</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2083-2</td>
<td>ARCS-1394</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1596</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1600</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2084-1</td>
<td>ARCS-1609</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1621</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1625</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1637</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2084-2</td>
<td>ARCS-1610</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1622</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1626</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1638</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2085-1</td>
<td>ARCS-1613</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1614</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1615</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1616</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1617</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

F-33
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS HW/F A B C</th>
<th>CRIT SCREENS HW/F A B C</th>
<th>OTHER ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KA-2085-1</td>
<td>ARCS-1618</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1629</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1630</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2086-1</td>
<td>ARCS-1607</td>
<td>3/3</td>
<td>3/2R P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1611</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1619</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1623</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2087-1</td>
<td>ARCS-1667</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1677</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1678</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1689</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1690</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1691</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1692</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1703</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1704</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1705</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1706</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1717</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1718</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1719</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1720</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2088-1</td>
<td>ARCS-1679</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1680</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1681</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1682</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1685</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1686</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1687</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1688</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1693</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1694</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1695</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1696</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1699</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1700</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1701</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1702</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1707</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1708</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1709</td>
<td>3/3</td>
<td>3/2R P P P EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1710</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDENTIFIERS</td>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------</td>
<td>------------------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HM/F A B C</td>
<td>HM/F A B C</td>
</tr>
<tr>
<td>05-6KA-2088-1</td>
<td>ARCS-1713</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1714</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1715</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1716</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1721</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1722</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1723</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1724</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1725</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1730</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2089-1</td>
<td>ARCS-1683</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
</tr>
<tr>
<td></td>
<td>ARCS-1697</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
</tr>
<tr>
<td></td>
<td>ARCS-1711</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
</tr>
<tr>
<td></td>
<td>ARCS-1725</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
</tr>
<tr>
<td>05-6KA-2089-2</td>
<td>ARCS-1684</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1698</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1712</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1726</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2090-1</td>
<td>ARCS-12008X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/2R</td>
</tr>
<tr>
<td>05-6KA-2090-2</td>
<td>ARCS-12009X</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2091-1</td>
<td>ARCS-12012X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-12013X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-12014X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-12015X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2092-1</td>
<td>ARCS-12010X</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12011X</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2093-1</td>
<td>ARCS-2029</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2030</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2071</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2072</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2089</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2090</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2125</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2126</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2094-1</td>
<td>ARCS-2046</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2056</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2062</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2074</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2106</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2116</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2128</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2094-2</td>
<td>ARCS-2045</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2055</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2061</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2073</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2105</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-35
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT HW/F</th>
<th>SCREENS A B C</th>
<th>CRIT HW/F</th>
<th>SCREENS A B C</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KA-2094-1</td>
<td>ARCS-2115</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2127</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2095-1</td>
<td>ARCS-2039</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2040</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2041</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2042</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2087</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2088</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2096-1</td>
<td>ARCS-2051</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2052</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2053</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2054</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2057</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2058</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2059</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2060</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2067</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2068</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2069</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2070</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2079</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2080</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2081</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2082</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2101</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2102</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2103</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2104</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2111</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2112</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2113</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2114</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2121</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2122</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2123</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2124</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2137</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2138</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2139</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2140</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2097-1</td>
<td>ARCS-2047</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2048</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2049</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2050</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2083</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2084</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2085</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2086</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-36
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS HW/F</th>
<th>CRIT SCREENS A B C</th>
<th>OTHER (SEE LEGEND CODE)</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KA-2097-1</td>
<td>ARCS-2107</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2108</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2109</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2110</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2129</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2130</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2131</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2132</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2098-1</td>
<td>ARCS-2031</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2032</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2033</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2034</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2035</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2036</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2037</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2038</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2063</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2064</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2065</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2066</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2075</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2076</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2077</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2078</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2091</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2092</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2093</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2094</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2097</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2098</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2099</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2100</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2117</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2118</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2119</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2120</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2133</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2134</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2135</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2136</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2099-1</td>
<td>ARCS-2324</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2325</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2326</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2327</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2328</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2329</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2330</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2331</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-37
<table>
<thead>
<tr>
<th>IDENTIFIERS</th>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>05-6KA-2099-1</td>
<td>ARCS-2332</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2333</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05-6KA-2102-1</td>
<td>ARCS-1641</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1642</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1647</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1648</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1651</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1652</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1653</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1656</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1659</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1660</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1664</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1666</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1668</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1670</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1672</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1673</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1674</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05-6KA-2103-1</td>
<td>ARCS-1643</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1645</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1647</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1649</td>
<td>2/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1661</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1663</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1667</td>
<td>3/3</td>
<td>3/2R</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1679</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1680</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1681</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1682</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1683</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1684</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1685</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1686</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-1687</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05-6KA-2109-1</td>
<td>ARCS-2149</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2150</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05-6KA-2110-1</td>
<td>ARCS-2141</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2142</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2143</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2144</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2145</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2146</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2147</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2148</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05-6KA-2111-1</td>
<td>ARCS-2149</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2150</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2141</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2142</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2143</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2144</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2145</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2146</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2147</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARCS-2148</td>
<td>3/1R</td>
<td>P</td>
<td>F</td>
<td>F</td>
<td>P</td>
<td>EPD&amp;C 2</td>
</tr>
</tbody>
</table>

F-38
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS HW/F A B C</th>
<th>CRIT SCREENS HW/F A B C</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-6KA-2127-1</td>
<td>ARCS-1551</td>
<td>2/2</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td></td>
<td>ARCS-1555</td>
<td>2/2</td>
<td>2/1R</td>
<td>P P P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td>05-6KA-2127-2</td>
<td>ARCS-1552</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1556</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
</tr>
<tr>
<td>05-6KA-2128-1</td>
<td>ARCS-1575</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1579</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1583</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1585</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2128-2</td>
<td>ARCS-1576</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1580</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1584</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1586</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2128A-1</td>
<td>ARCS-1573</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1577</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1581</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1587</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2128A-2</td>
<td>ARCS-1574</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1578</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1582</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1588</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td>05-6KA-2130-1</td>
<td>ARCS-2023</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2025</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2027</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2130-2</td>
<td>ARCS-2024</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2026</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2028</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2132-1</td>
<td>ARCS-1561</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1563</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1569</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1571</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2132-2</td>
<td>ARCS-1562</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1564</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1570</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1572</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2133-1</td>
<td>ARCS-1557</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1559</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1565</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1567</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2133-2</td>
<td>ARCS-1558</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1560</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1566</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1568</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P NA P</td>
</tr>
<tr>
<td>05-6KA-2136-1</td>
<td>ARCS-1541</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1543</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2136-2</td>
<td>ARCS-1542</td>
<td>2/1R</td>
<td>P F P</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1544</td>
<td>2/1R</td>
<td>P F P</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2137-1</td>
<td>ARCS-1549</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1553</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMEA NUMBER</td>
<td>IDENTIFIERS</td>
<td>NASA</td>
<td>IOA</td>
<td>CRIT</td>
<td>SCREENS</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>05-6KA-2137-2</td>
<td>ARCS-1550</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
</tr>
<tr>
<td></td>
<td>ARCS-1554</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
</tr>
<tr>
<td>05-6KA-2151-1</td>
<td>ARCS-1413</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td>05-6KA-2153-1</td>
<td>ARCS-1857</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td>05-6KA-2155-1</td>
<td>ARCS-1859</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td>05-6KA-2155-2</td>
<td>ARCS-1550</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
</tr>
<tr>
<td>05-6KA-2155-2</td>
<td>ARCS-1859A</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
</tr>
<tr>
<td>05-6KA-2156-1</td>
<td>ARCS-12016X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2156-2</td>
<td>ARCS-12017X</td>
<td>3/1R</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2159-1</td>
<td>ARCS-1856</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2166-1</td>
<td>ARCS-1306</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167-2</td>
<td>ARCS-1308</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167-2</td>
<td>ARCS-1314</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167-2</td>
<td>ARCS-1315</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167-2</td>
<td>ARCS-1316</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-1</td>
<td>ARCS-1300</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-1</td>
<td>ARCS-1302</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-1</td>
<td>ARCS-1304</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-1</td>
<td>ARCS-1310</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-1</td>
<td>ARCS-1312</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-2</td>
<td>ARCS-1303</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-2</td>
<td>ARCS-1305</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-2</td>
<td>ARCS-1311</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167A-2</td>
<td>ARCS-1313</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2167X-1</td>
<td>ARCS-12018X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2168X-2</td>
<td>ARCS-12019X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2168X-1</td>
<td>ARCS-12020X</td>
<td>3/2R</td>
<td>P P P</td>
<td>2/2</td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td>05-6KA-2168X-2</td>
<td>ARCS-12021X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1873</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1875</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1881</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1885</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1888</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1890</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1897</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1901</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1872</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1874</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1880</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1884</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1889</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1891</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-1</td>
<td>ARCS-1896</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2169-2</td>
<td>ARCS-1900</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT Screens</td>
<td>CRIT Screens</td>
<td>OTHER</td>
<td>ISSUE</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>05-6KA-2180-1</td>
<td>ARCS-1879</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1883</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1887</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1892</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1893</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1894</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1895</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1899</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1903</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2180-2</td>
<td>ARCS-1876</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1878</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1882</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1886</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1892</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1893</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1894</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1895</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1896</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1897</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1902</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2180-1</td>
<td>ARCS-1905</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2184-1</td>
<td>ARCS-1907</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2184-2</td>
<td>ARCS-1904</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1906</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2185-1</td>
<td>ARCS-2001</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2003</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2185-2</td>
<td>ARCS-2000</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-2002</td>
<td>3/1R P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2201-1</td>
<td>ARCS-1346</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1358</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2201-2</td>
<td>ARCS-1347</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1349</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1359</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1361</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2201A-1</td>
<td>ARCS-1348</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1360</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2202-1</td>
<td>ARCS-1342</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1344</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1354</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1356</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2202-2</td>
<td>ARCS-1343</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1345</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1355</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1357</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2202A-1</td>
<td>ARCS-1338</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1340</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1350</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1352</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2202A-2</td>
<td>ARCS-1339</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1341</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1351</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1353</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2206-1</td>
<td>ARCS-1472</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>NASA</td>
<td>IOA</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
</tr>
<tr>
<td>----------</td>
<td>--------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>FMEA NUMBER</td>
<td>ASSESSMENT NUMBER</td>
<td>HW/F</td>
<td>A B C</td>
<td>HW/F</td>
<td>A B C</td>
</tr>
<tr>
<td>05-6KA-2206-1</td>
<td>ARCS-1474</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2206-2</td>
<td>ARCS-1473</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2207-1</td>
<td>ARCS-1475</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2207-2</td>
<td>ARCS-1478</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2207A-1</td>
<td>ARCS-1484</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2208-1</td>
<td>ARCS-1479</td>
<td>3/3</td>
<td></td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2208-2</td>
<td>ARCS-1485</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2208A-1</td>
<td>ARCS-1476</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2209-1</td>
<td>ARCS-1477</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2209-2</td>
<td>ARCS-1482</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2210-1</td>
<td>ARCS-1483</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2210-2</td>
<td>ARCS-1496</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2210A-1</td>
<td>ARCS-1498</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2211-1</td>
<td>ARCS-1500</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2211-2</td>
<td>ARCS-1502</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2211A-1</td>
<td>ARCS-1504</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2211A-2</td>
<td>ARCS-1506</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2212-1</td>
<td>ARCS-1508</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2212-2</td>
<td>ARCS-1510</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P P P</td>
</tr>
<tr>
<td>05-6KA-2213-1</td>
<td>ARCS-1509</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2213-2</td>
<td>ARCS-1511</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2214-1</td>
<td>ARCS-1521</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2214-2</td>
<td>ARCS-1522</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-42
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>HW/F</td>
<td>A B C</td>
<td>HW/F</td>
<td>A B C</td>
<td>(SEE LEGEND CODE)</td>
<td></td>
</tr>
<tr>
<td>05-6KA-2213-2</td>
<td>ARCS-1982</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1984</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1986</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1990</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2216-1</td>
<td>ARCS-2300</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2302</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2304</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2306</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2216-2</td>
<td>ARCS-2301</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2303</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2305</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-2307</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2217-1</td>
<td>ARCS-1488</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1490</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1492</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1494</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2217-2</td>
<td>ARCS-1489</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1491</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1493</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1495</td>
<td>3/3</td>
<td></td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2218-1</td>
<td>ARCS-1480</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1486</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2218-2</td>
<td>ARCS-1481</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1487</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2220-1</td>
<td>ARCS-1997</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1999</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2220-2</td>
<td>ARCS-1996</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2222-1</td>
<td>ARCS-2308</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2222-2</td>
<td>ARCS-2309</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2224-1</td>
<td>ARCS-12034X</td>
<td>3/1R</td>
<td>P F P</td>
<td>2/2</td>
<td></td>
<td>EPD&amp;C 4</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2224-2</td>
<td>ARCS-12035X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2251-1</td>
<td>ARCS-1318</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1320</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1328</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1330</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2251-2</td>
<td>ARCS-1319</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1321</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1329</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1331</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2252-1</td>
<td>ARCS-1322</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1324</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1332</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1334</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2252-2</td>
<td>ARCS-1323</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>FMIA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2252-2</td>
<td>ARCS-1325</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1333</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1335</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2252-3</td>
<td>ARCS-12340X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12341X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12342X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12343X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253-1</td>
<td>ARCS-12086X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12088X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253-2</td>
<td>ARCS-12087X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12089X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253A-1</td>
<td>ARCS-12090X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12091X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253B-1</td>
<td>ARCS-12092X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12093X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253C-1</td>
<td>ARCS-12094X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12095X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253D-1</td>
<td>ARCS-12096X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12097X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253E-1</td>
<td>ARCS-12098X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253E-2</td>
<td>ARCS-12099X</td>
<td>2/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C  3</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253F-1</td>
<td>ARCS-12100X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2253F-2</td>
<td>ARCS-12101X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254-1</td>
<td>ARCS-12107X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12109X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254-2</td>
<td>ARCS-12108X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12110X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254A-1</td>
<td>ARCS-12111X</td>
<td>3/2R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12112X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254B-1</td>
<td>ARCS-12113X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12114X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254C-1</td>
<td>ARCS-12115X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12116X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254D-1</td>
<td>ARCS-12117X</td>
<td>3/1R P P P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12118X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254E-1</td>
<td>ARCS-12119X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254E-2</td>
<td>ARCS-12120X</td>
<td>3/1R P P P</td>
<td>2/2</td>
<td>EPD&amp;C  3</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254F-1</td>
<td>ARCS-12121X</td>
<td>3/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2254F-2</td>
<td>ARCS-12122X</td>
<td>3/1R P P P</td>
<td>3/1R P P P</td>
<td>EPD&amp;C  3</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255-1</td>
<td>ARCS-12192X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12194X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12208X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12210X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12224X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12226X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12240X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12242X</td>
<td>2/1R P P P</td>
<td>3/3</td>
<td>EPD&amp;C  2</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255-2</td>
<td>ARCS-12193X</td>
<td>3/3</td>
<td>3/2R P P P</td>
<td>EPD&amp;C  1</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMEA NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255-2</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255A-1</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255A-2</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255B-1</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255B-2</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255C-1</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255C-2</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255D-1</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255D-2</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255E-1</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2255E-2</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(SEE LEGEND CODE)
<table>
<thead>
<tr>
<th>IDENTIFIERS</th>
<th>NASA</th>
<th>IOA</th>
<th>CRIT SCREENS</th>
<th>CRIT SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FMEA NUMBER</td>
<td>ASSESSMENT NUMBER</td>
<td>HW/F</td>
<td>A B C</td>
<td>HW/F</td>
<td>A B C</td>
</tr>
<tr>
<td>05-6KA-2255F-1</td>
<td>ARCS-12206X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12222X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12238X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12254X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2255F-2</td>
<td>ARCS-12207X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td></td>
<td>ARCS-12223X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td></td>
<td>ARCS-12239X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td></td>
<td>ARCS-12255X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td>05-6KA-2257-1</td>
<td>ARCS-12036X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2257-2</td>
<td>ARCS-12037X</td>
<td>3/3</td>
<td>P F P</td>
<td>3/2R</td>
<td>P F P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257A-1</td>
<td>ARCS-12038X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2257B-1</td>
<td>ARCS-12046X</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257B-2</td>
<td>ARCS-12047X</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257C-1</td>
<td>ARCS-12044X</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257C-2</td>
<td>ARCS-12050X</td>
<td>3/2R</td>
<td>P P P</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257D-1</td>
<td>ARCS-12045X</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257E-1</td>
<td>ARCS-12059X</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257E-3</td>
<td>ARCS-12060X</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257F-1</td>
<td>ARCS-12061X</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257G-1</td>
<td>ARCS-12063X</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257H-1</td>
<td>ARCS-12065X</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2257I</td>
<td>ARCS-12052X</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2259</td>
<td>ARCS-1914</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2259</td>
<td>ARCS-1922</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>05-6KA-2259</td>
<td>ARCS-1926</td>
<td>3/3</td>
<td>P P P</td>
<td>3/3</td>
<td>P P P</td>
<td>EPD&amp;C 6</td>
</tr>
<tr>
<td>IDENTIFIERS</td>
<td>NASA</td>
<td>IOA RECOMMENDATIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>----------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMEA NUMBER</td>
<td>ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HW/F A B C</td>
<td>HW/F A B C</td>
<td>(SEE LEGEND CODE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2259-2</td>
<td>ARCS-1934</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1948</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1954</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1960</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1968</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2259A-1</td>
<td>ARCS-1917</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1925</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1929</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1937</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1951</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1957</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1963</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1971</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2259A-2</td>
<td>ARCS-1916</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1924</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1928</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1936</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1950</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1956</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1962</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1970</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2260-1</td>
<td>ARCS-12345X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12346X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12349X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12350X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12353X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12354X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12356X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12357X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12358X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1909</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1911</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1931</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1941</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1943</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1945</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1965</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1975</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2260-2</td>
<td>ARCS-1908</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1910</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1930</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1940</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1942</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1944</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1964</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1974</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-1</td>
<td>ARCS-12130X</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12132X</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/3</td>
<td>EPD&amp;C 2</td>
<td>X</td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>OTHER</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>05-6KA-2261-1</td>
<td>ARCS-12151X</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>ARCS-12153X</td>
<td>2/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2261-2</td>
<td>ARCS-12131X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12133X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12152X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12154X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-1</td>
<td>ARCS-12134X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12155X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-2</td>
<td>ARCS-12135X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12156X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-1</td>
<td>ARCS-12136X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12157X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-2</td>
<td>ARCS-12137X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12158X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-1</td>
<td>ARCS-12138X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12159X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-2</td>
<td>ARCS-12139X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12160X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-1</td>
<td>ARCS-12140X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12161X</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-2</td>
<td>ARCS-12141X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12162X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2261-1</td>
<td>ARCS-12142X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>ARCS-12163X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2261-2</td>
<td>ARCS-12143X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td></td>
<td>ARCS-12164X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/1R</td>
<td>P F P</td>
<td>EPD&amp;C 3</td>
</tr>
<tr>
<td>05-6KA-2261F-1</td>
<td>ARCS-12144X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>ARCS-12165X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2261F-2</td>
<td>ARCS-12145X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td></td>
<td>ARCS-12166X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2265-1</td>
<td>ARCS-12347X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12348X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12351X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12352X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12355X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12359X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12360X</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1913</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1920</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1933</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1959</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2265-1</td>
<td>ARCS-1953</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1959</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1967</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1973</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2265-2</td>
<td>ARCS-1912</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1921</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1932</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>OTHER</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>05-6KA-2265-2</td>
<td>ARCS-1938</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1952</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1958</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1966</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1972</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2267-1</td>
<td>ARCS-1326</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1336</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2267-2</td>
<td>ARCS-1327</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1337</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2268-1</td>
<td>ARCS-12123X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2268-2</td>
<td>ARCS-12124X</td>
<td>3/1R</td>
<td>P P P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2269-1</td>
<td>ARCS-1448</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1452</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-1456</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2269-2</td>
<td>ARCS-1449</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1453</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1457</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1461</td>
<td>3/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2270-1</td>
<td>ARCS-12361X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2270-2</td>
<td>ARCS-12362X</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1977</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1979</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2271-1</td>
<td>ARCS-1919</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1947</td>
<td>3/1R</td>
<td>P F P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2271-2</td>
<td>ARCS-1918</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-1946</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2279-1</td>
<td>ARCS-12054X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ARCS-12056X</td>
<td>3/3</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 1</td>
<td>X</td>
</tr>
<tr>
<td>05-6KA-2279-2</td>
<td>ARCS-12055X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12057X</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2280-1</td>
<td>ARCS-12072X</td>
<td>3/1R</td>
<td>P P P</td>
<td>2/2</td>
<td></td>
<td>EPD&amp;C 4</td>
</tr>
<tr>
<td>05-6KA-2280-2</td>
<td>ARCS-12073X</td>
<td>3/1R</td>
<td>P F P</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 2</td>
</tr>
<tr>
<td>05-6KA-2302-1</td>
<td>ARCS-12322X</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12324X</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-6KA-2303-1</td>
<td>ARCS-12321X</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12323X</td>
<td>2/1R</td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NONE</td>
<td>ARCS-12068X</td>
<td>3/1R</td>
<td>P NA P</td>
<td>EPD&amp;C 5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12069X</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12070X</td>
<td>3/1R</td>
<td>P NA P</td>
<td>EPD&amp;C 5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12071X</td>
<td>3/3</td>
<td></td>
<td>EPD&amp;C 5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12074X</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12075X</td>
<td>3/2R</td>
<td>P P P</td>
<td>EPD&amp;C 5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12325X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12326X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARCS-12327X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-49
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS HW/F</th>
<th>CRIT</th>
<th>SCREENS HW/F</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>ARCS-12328X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-12329X</td>
<td></td>
<td>2/1R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12330X</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12331X</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12332X</td>
<td></td>
<td>2/2</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12333X</td>
<td></td>
<td>3/1R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12334X</td>
<td></td>
<td>3/1R</td>
<td>NA P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12335X</td>
<td></td>
<td>3/1R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12336X</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 1,5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12337X</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 1,5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12338X</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 1,5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-12339X</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 1,5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-1664</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-1646</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-1650</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-1662</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-1664</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-1668</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2043</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2095</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2263</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2264</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2265</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2266</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2267</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2286</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2287</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2288</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2296</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2297</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2334</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2335</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2336</td>
<td></td>
<td>3/2R</td>
<td>P P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2337</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2338</td>
<td></td>
<td>3/2R</td>
<td>F P</td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2339</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2340</td>
<td></td>
<td>2/2</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ARCS-2341</td>
<td></td>
<td>3/3</td>
<td></td>
<td></td>
<td>EPD&amp;C 5</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>IDENTIFIERS</th>
<th>NASA</th>
<th>IOA RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMEA NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
</tr>
<tr>
<td></td>
<td>HW/F</td>
<td>A B C</td>
</tr>
<tr>
<td>FRCS-1058</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1059</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1060</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1061</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1062</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1063</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1064</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1065</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1066</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1067</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1068</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1069</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1070</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1071</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1072</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1073</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1074</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1075</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1076</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1077</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1078</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1079</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1080</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1081</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1082</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1083</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1085</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1086</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1087</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1088</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1089</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1090</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1091</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1092</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1093</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1094</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1095</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1096</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1097</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1098</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1099</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1101</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G-2
<table>
<thead>
<tr>
<th>IDENTIFIERS</th>
<th>NASA</th>
<th>IOA RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMEA NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
</tr>
<tr>
<td></td>
<td>HW/F</td>
<td>A B C</td>
</tr>
<tr>
<td>FRCS-1102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1103</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1106</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1107</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1109</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1112</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1117</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1118</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1119</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1122</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1123</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1124</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1126</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1127</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1131</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1247</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1248</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1249</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1251</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1252</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1253</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1256</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1257</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1258</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1259</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1261</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1262</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1263</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1264</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS HW/F</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>FRCS-1265</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1266</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1267</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1268</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1269</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1270</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1271</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1272</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1273</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1274</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1275</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1276</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1277</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1278</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1279</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1280</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1281</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1282</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1283</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1284</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1286</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1287</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1288</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-1289</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-358</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-359</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-360</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-361</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-362</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-363</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-364</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-366</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-368</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-369</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-370</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-371</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-372</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-383</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-384</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-532</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-533</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-534</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-535</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-536</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-537</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>FRCS-538</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-539</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-540</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-541</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-542</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-543</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-544</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-545</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-546</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-547</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-548</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-549</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-550</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-551</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-553</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-554</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-555</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-556</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-557</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-558</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-559</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-560</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-561</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-562</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-563</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-564</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-565</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-566</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-567</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-568</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-569</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-570</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-571</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-572</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-573</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-574</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-575</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-576</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-577</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-578</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-579</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-580</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-581</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-582</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-583</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-584</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-585</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-586</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-587</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-588</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-589</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA</td>
<td>IOA</td>
<td>CRIT</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>FMEA NUMBER</td>
<td>ASSESSMENT NUMBER</td>
<td>HW/F</td>
</tr>
<tr>
<td>FRCS-690</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-691</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-692</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-693</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-694</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-695</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-701</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-774</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-775</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-776</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-777</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-778</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-779</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-780</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-781</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-782</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-783</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-784</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-785</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-786</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-787</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-788</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-789</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-790</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-791</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-792</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-793</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-794</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-795</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-796</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-797</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-798</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-799</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-801</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-802</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-803</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-804</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-805</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-806</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-807</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-808</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-809</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-810</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-811</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-812</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-813</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G-6
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT SCREENS</th>
<th>CRIT SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRCS-814</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-815</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-816</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-817</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-818</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-819</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-820</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-821</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-822</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-823</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-824</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-825</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-826</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-827</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-828</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-829</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-830</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-831</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-832</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-833</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-834</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-835</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-836</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-837</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-838</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-839</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-840</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCS-884</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS</td>
<td>CRIT SCREENS</td>
<td>OTHER</td>
<td>ISSUE</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>ARCS-1398</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1399</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1401</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1402</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1403</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1404</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1405</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1406</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1407</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1408</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1409</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1410</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1411</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1412</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1426</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1427</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1428</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1429</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1430</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1431</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1432</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1433</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1434</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1435</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1436</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1437</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1438</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1439</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1440</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1441</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1442</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1443</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1444</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1445</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1446</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1447</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1450</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1451</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1454</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1455</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1458</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1459</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1462</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1463</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1464</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1465</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1466</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS HW/F</td>
<td>CRIT SCREENS A B C</td>
<td>OTHER (SEE LEGEND CODE)</td>
<td>ISSUE</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>ARCS-1749</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1751</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1752</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1753</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1754</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1755</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1756</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1757</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1758</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1759</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1760</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1761</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1762</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1763</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1764</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1765</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1766</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1767</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1768</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1769</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1770</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1771</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1772</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1773</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1774</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1775</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1776</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1777</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1778</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1779</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1780</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1781</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1782</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1783</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1784</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1785</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1786</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1787</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1788</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1789</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1790</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1791</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1792</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1793</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1794</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1795</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1796</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS 10000-2:2018</td>
<td>IDENTIFIERS</td>
<td>NASA</td>
<td>IOA RECOMMENDATIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>------</td>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT SCREENS (A B C)</td>
<td>CRIT SCREENS (A B C)</td>
<td>OTHER (SEE LEGEND CODE)</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>ARCS-1797</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1798</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1799</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1801</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1802</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1803</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1804</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1805</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1806</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1807</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1808</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1809</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1810</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1811</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1812</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1813</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1814</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1815</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1816</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1817</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1818</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1819</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1820</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1821</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1822</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1823</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1824</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1825</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1826</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1827</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1828</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1829</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1830</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1831</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1832</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1833</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1834</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1835</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1836</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1837</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1838</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1839</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1840</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1841</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1842</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1843</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1844</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G-11
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>CRIT</th>
<th>SCREENS</th>
<th>OTHER</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCS-1845</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1846</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1847</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1848</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1849</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1850</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1851</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1852</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1853</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1854</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-1855</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2151</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2152</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2153</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2154</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2155</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2156</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2157</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2158</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2159</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2161</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2162</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2163</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2164</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2165</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2166</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2167</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2168</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2169</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2170</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2171</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2172</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2173</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2174</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2175</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2176</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2177</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2178</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2179</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2181</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2182</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2183</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2184</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2185</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2186</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2187</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G-12
<table>
<thead>
<tr>
<th>NASA FMEA NUMBER</th>
<th>IOA ASSESSMENT NUMBER</th>
<th>NASA CRIT SCRENS</th>
<th>IOA RECOMMENDATIONS CRIT SCRENS</th>
<th>OTHER (SEE LEGEND CODE)</th>
<th>ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCS-2188</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2189</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2190</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2191</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2192</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2193</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2194</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2195</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2196</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2197</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2198</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2199</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2201</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2202</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2203</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2204</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2205</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2206</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2207</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2208</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2209</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2210</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2211</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2212</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2213</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2214</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2215</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2216</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2217</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2218</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2219</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2220</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2221</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2222</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2223</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2224</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2225</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2226</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2227</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2228</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2229</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2230</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2231</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2232</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2233</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2234</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2235</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>ARCS-2236</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2237</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2238</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2239</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2241</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2242</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2243</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2244</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2245</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2246</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2247</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2248</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2249</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2251</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2252</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2253</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2254</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2255</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2256</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2257</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2258</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2259</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2260</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2261</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2262</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2315</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2342</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2343</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2344</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2345</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2346</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2347</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2348</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2349</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2351</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2352</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2353</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2354</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2355</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2356</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2357</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2358</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2359</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2360</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2361</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NASA FMEA NUMBER</td>
<td>IOA ASSESSMENT NUMBER</td>
<td>CRIT</td>
<td>SCREENS</td>
<td>CRIT</td>
<td>SCREENS</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>------</td>
<td>---------</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>ARCS-2362</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2363</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2364</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2365</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2366</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2367</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2368</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2369</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2370</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCS-2371</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>