INDEPENDENT ORBITER ASSESSMENT

ANALYSIS OF THE ELECTRICAL POWER DISTRIBUTION AND CONTROL/ ELECTRICAL POWER GENERATION SUBSYSTEM

19 DECEMBER 1986

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

WORKING PAPER NO. 1.0-WP-VA86001-19

INDEPENDENT ORBITER ASSESSMENT ANALYSIS OF THE EPD&C/EPG SUBSYSTEM

19 DECEMBER 1986

This Working Paper is Submitted to NASA under
Task Order No. VA86001, Contract NAS 9-17650

PREPARED BY: Jeff A Patton
J.A. Patton
Engineer
Independent Orbiter
Assessment

APPROVED BY: K.R. Schmeckpeper
K.R. Schmeckpeper
EPD&C Lead
Independent Orbiter
Assessment

APPROVED BY: G.W. Khori
G.W. Khori
Technical Manager
Independent Orbiter
Assessment

APPROVED BY: W F Huning
W.F. Huning
Deputy Program Manager
STSEOS

CONTENTS

List of Figures

List of Tables

Independent Orbiter Assessment
Analysis of the EPD&C/EPG Subsystem

1.0 EXECUTIVE SUMMARY

The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. The IOA approach features a top-down analysis of the hardware to determine failure modes, criticality, and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. This report documents (Appendix C) the independent analysis results corresponding to the Orbiter Electrical Power Distribution and Control (EPD&C)/Electrical Power Generation (EPG) hardware.

The EPD&C/EPG hardware is required for performing critical functions of cryogenic reactant storage, electrical power generation and product water distribution in the Orbiter. Specifically, the EPD&C/EPG hardware consists of the following components:

- o Power Section Assembly (PSA)
- o Reactant Control Subsystem (RCS)
- o Thermal Control Subystem (TCS)
- o Water Removal Subsystem (WRS)
- o Power Reactant Storage and Distribution System (PRSDS)

The IOA analysis process utilized available EPD&C/EPG hardware drawings and schematics for defining hardware assemblies, components, and hardware items. Each level of hardware was evaluated and analyzed for possible failure modes and effects. Criticality was assigned based upon the severity of the effect for each failure mode.

Figure 1 presents a summary of the failure criticalities for each of the five major subdivisions of the EPD&C/EPG. A summary of the number of failure modes, by criticality, is also presented below with Hardware (HW) criticality first and Functional (F) criticality second.

Summary of IOA Failure Modes By Criticality (HW/F)

Criticality :	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number :	4	36	-	85	27	110	262

EPD&C/EPG OVERVIEW ANALYSIS SUMMARY

EPD&C/EPG ANALYSIS SUMMARY

CRIT.	#FM	#PCI
1/1	0	4
2/1R	41	36
2/2	0	0
3/1R	76	18
3/2R	31	2
3/3	114	0

POWER SECTION ASSEMBLY

CRIT.	#FM	#PCI
1/1	0	0
2/1R	2	2
2/2	0	0
3/1R	11	1
3/2R	1	0
3/3	39	NA

REACTANT CONTROL SUBSYSTEM

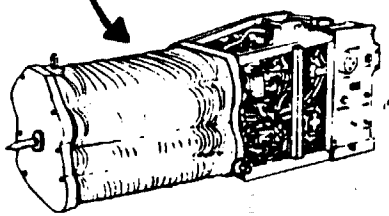
CRIT.	#FM	#PCI
1/1	0	0
2/1R	0	0
2/2	0	0
3/1R	14	8
3/2R	24	2
3/3	27	NA

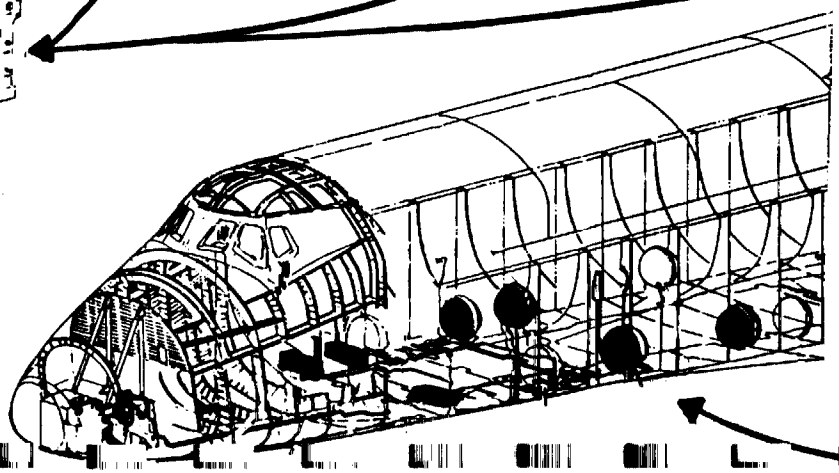
THERMAL CONTROL SYSTEM

CRIT.	#FM	#PCI
1/1	0	0
2/1R	3	3
2/2	0	0
3/1R	1	0
3/2R	0	0
3/3	9	NA

WATER REMOVAL SYSTEM

CRIT.	#FM	#PCI
1/1	0	0
2/1R	19	19
2/2	0	0
3/1R	25	1
3/2R	2	0
3/3	29	NA





POWER REACTANT STORAGE DISTRIBUTION SYSTEM

CRIT.	#FM	#PCI
1/1	4	4
2/1R	12	12
2/2	0	0
3/1R	34	8
3/2R	0	0
3/3	6	NA

CRIT - CRITICALITY
FM - FAILURE MODE
PCI - POTENTIAL CRITICAL ITEM

Figure 1 - EPD&C/EPG OVERVIEW ANALYSIS SUMMARY

For each failure mode identified, the criticality and redundancy screens were examined to identify critical items. A summary of Potential Critical Items (PCIs) is presented as follows:

Summary of IOA Potential Critical Items (HW/F)						
Criticality :	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
Number :	4	36	-	18	2	60

2.0 INTRODUCTION

2.1 Purpose

The 51-L Challenger accident prompted the NASA to readdress safety policies, concepts, and rationale being used in the National Space Transportation System (NSTS). The NSTS Office has undertaken the task of reevaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assesment of the Orbiter FMEA/CIL reevaluation results for completeness and technical accuracy.

2.2 Scope

The scope of the independent FMEA/CIL assessment activity encompasses those Shuttle Orbiter subsystems and GFE hardware identified in the Space Shuttle Independent FMEA/CIL Assessment Contractor Statement of Work. Each subsystem analysis addresses hardware, functions, internal and external interfaces, and operational requirements for all mission phases.

2.3 Analysis Approach

The independent analysis approach is a top-down analysis utilizing as-built drawings to breakdown the respective subsystem into components and low-level hardware items. Each hardware item is evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the NASA and Prime Contractor FMEA/CIL reevaluation results. The IOA analysis approach is summarized in the following Steps 1.0 through 3.0. Step 4.0 summarizes the assessment of the NASA and Prime Contractor FMEAs/CILs that is performed and documented at a later date.

Step 1.0 Subsystem Familiarization
- 1.1 Define subsystem functions
- 1.2 Define subsystem components
- 1.3 Define subsystem specific ground rules and assumptions

Step 2.0 Define subsystem analysis diagram
- 2.1 Define subsystem
- 2.2 Define major assemblies
- 2.3 Develop detailed subsystem representations

Step 3.0 Failure events definition
- 3.1 Construct matrix of failure modes
- 3.2 Document IOA analysis results

Step 4.0 Compare IOA analysis data to NASA FMEA/CIL
- 4.1 Resolve differences
- 4.2 Review in-house
- 4.3 Document assessment issues
- 4.4 Forward findings to Project Manager

2.4 EPD&C/EPG Ground Rules and Assumptions

The EPD&C/EPG ground rules and assumptions used in the IOA are defined in Appendix B.

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The EPD&C/EPG consists of hardware that is required for the command and control of electrical power generation, FC operation, and cryogenic reactant distribution and control in the Orbiter. The EPD&C/EPG consists of the following divisions:

1. The Power Section Assembly (PSA) utilizes the cryogenic reactants to produce the necessary electrical power for the Orbiter. By-products of this reaction include excess water and heat. The PSA is composed of cell plates, pressure plates, heater/insulator plates, and cell voltage harnesses. Each stack contains ninety-six cell plates grouped into three substacks connected in series. Analog data outputs from each cell are transmitted to the Orbiter via a cell performance monitor.

2. The Reactant Control Subsystem (RCS) heats the cryogenic reactants from the PRSDS to an acceptable temperature for use in the PSA. The RCS delivers reactants and controls the pressure within the cell plates. Purging of the inert gases from the reactant lines is provided along with the circulation of hydrogen for excess water removal from the PSA. The RCS is composed of preheaters, reactant regulator, hydrogen pump-separator, condenser, and reactant purge/vent lines.

3. The Thermal Control System (TCS) controls operating temperatures and electrolyte concentration in the PSA. Waste heat is used to condense water vapor. Heat is also transferred to the preheaters for the reactant gases and rejected via the Orbiter vehicle cooling system.

4. The Water Removal Subsystem (WRS) removes product water from the PSA during normal operation. The excess water is produced from water vapor which is converted to a liquid by the condenser. The WRS delivers the water to the Orbiter vehicle potable water storage system or to the water relief line. The WRS consists of the condenser, hydrogen pump-separator, water trap, water discharge line, and water purity sensor.

5. The Power Reactant Storage and Distribution System (PRSDS) stores the cryogenic reactants (hydrogen and oxygen) for use in the production of electrical power in the fuel cells. The PRSDS can be configured to include up to five tanks of each of the reactant gases.

Each tank contains redundant heating elements and sensors to maintain the gases at the proper pressure. The PRSDS also provides gases to the Environmental Control and Life Support System (ECLSS).

3.2 Interfaces and Locations

The elements of the EPD&C/EPG are installed in the mid-body of the Orbiter vehicle beneath the payload bay liner. Each of the three fuel cells are located in the forward part of the bay, with FCP 1 on the left-hand side, with FCP 2 and FCP 3 located forward and aft, respectively on the right-hand side. Each of the PRSDS cryogenic reactant storage tanks are located along the outer edges of the payload bay under the liner. Cryogenic reactants (oxygen and hydrogen) are transferred on demand to the FCP and oxygen is transported directly to the ECLSS. Crew command and control is achieved via switches, circuit breakers, or meters located in the Orbiter cabin. Product water from the PSA is transported to the ECLSS for storage and waste heat is rejected to the cooling system. Three-phase AC electrical power is received from the Orbiter by the FCP to power the coolant pump, hydrogen pump-separator, and the water purity sensor. DC power generated by the FCP is distributed by the EPD&C. Reference Figure 5.

3.3 Hierarchy

Figure 2 illustrates the hierarchy of the EPD&C/EPG hardware and the corresponding subcomponents. Figures 3 through 6 comprise the detailed system representation.

ELECTRICAL POWER DISTRIBUTION AND CONTROL/ELECTRICAL POWER GENERATION SUBSYSTEM OVERVIEW

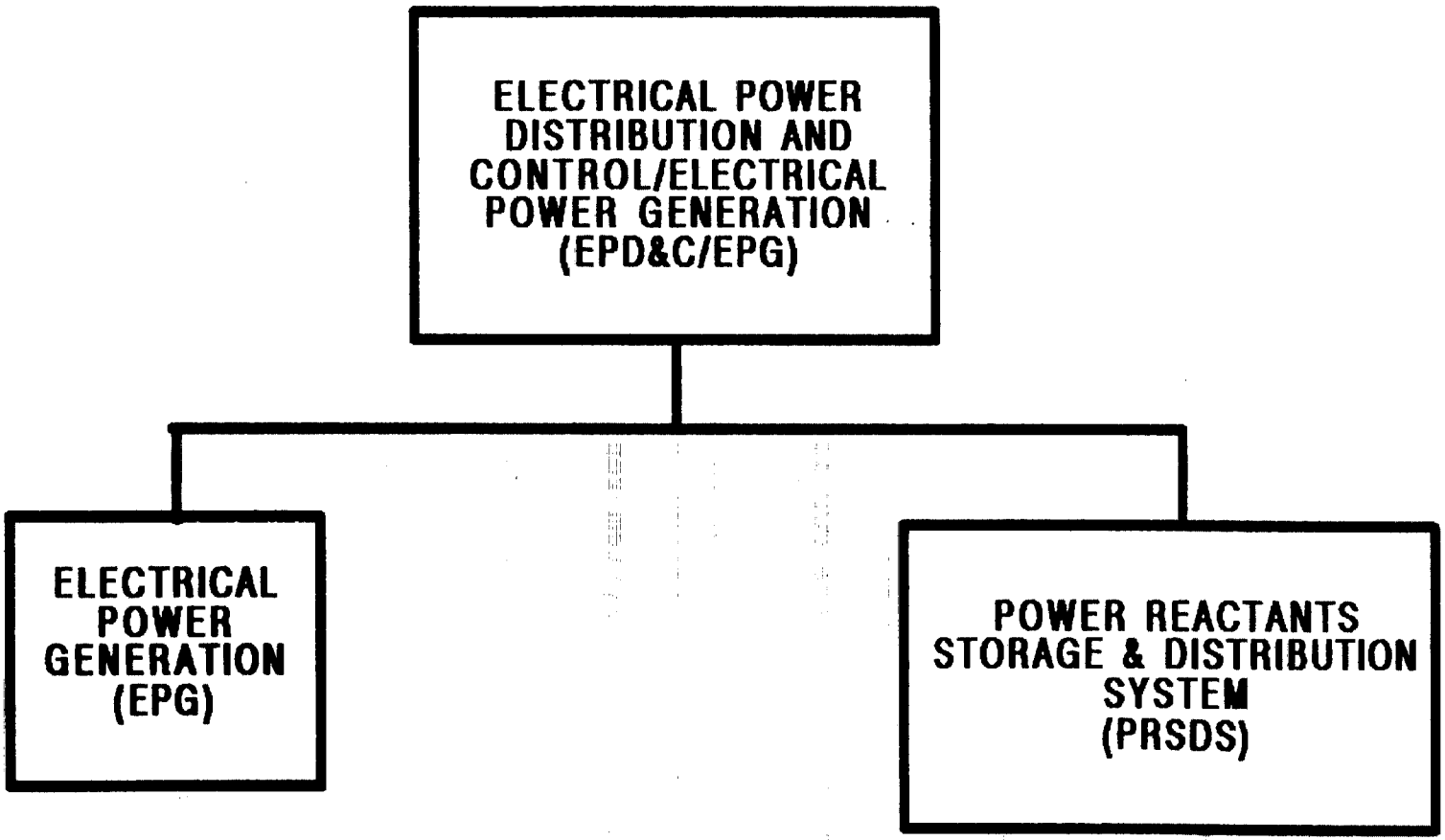


Figure 2 - EPD&C/EPG SUBSYSTEM OVERVIEW

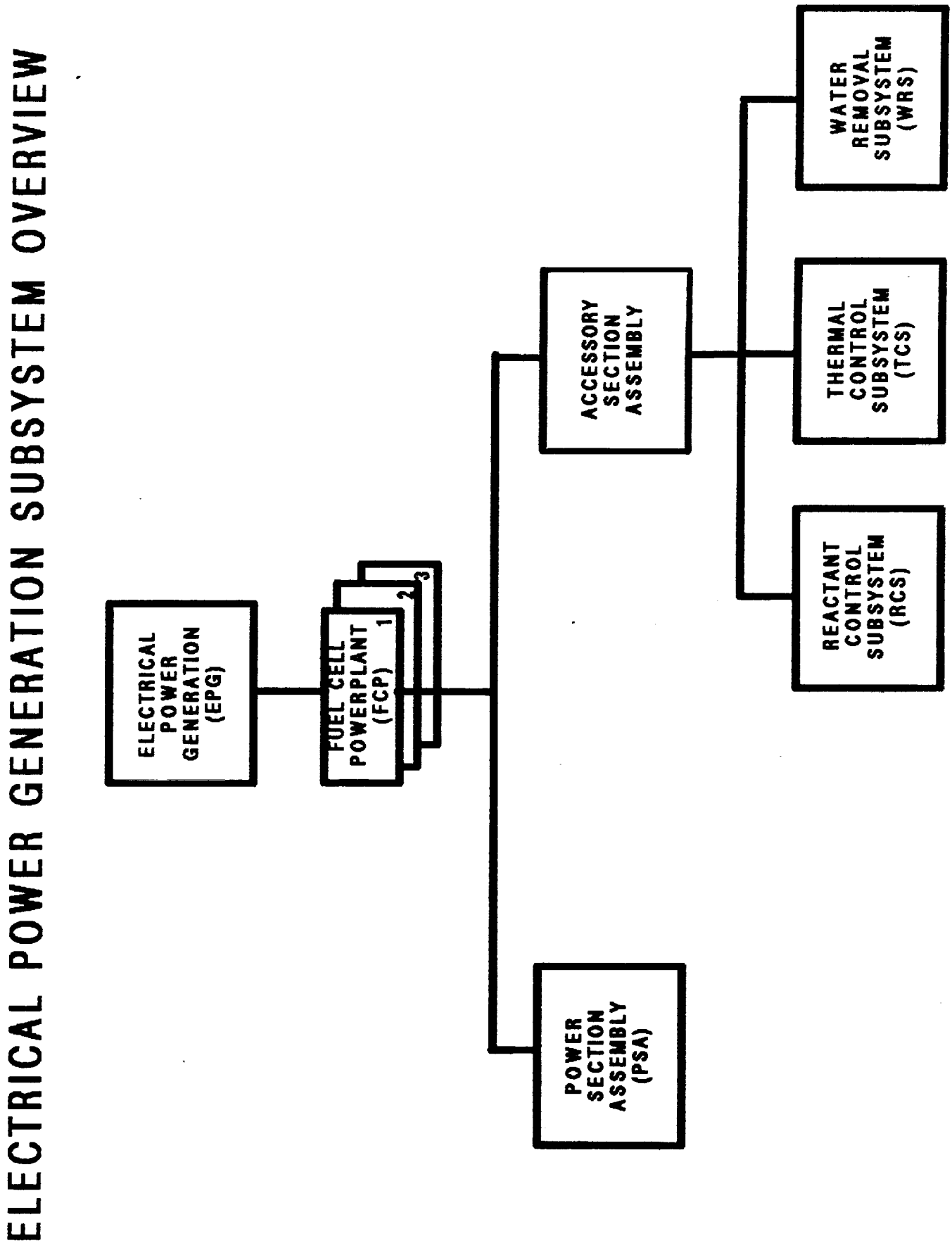


Figure 3 - EPG SUBSYSTEM OVERVIEW

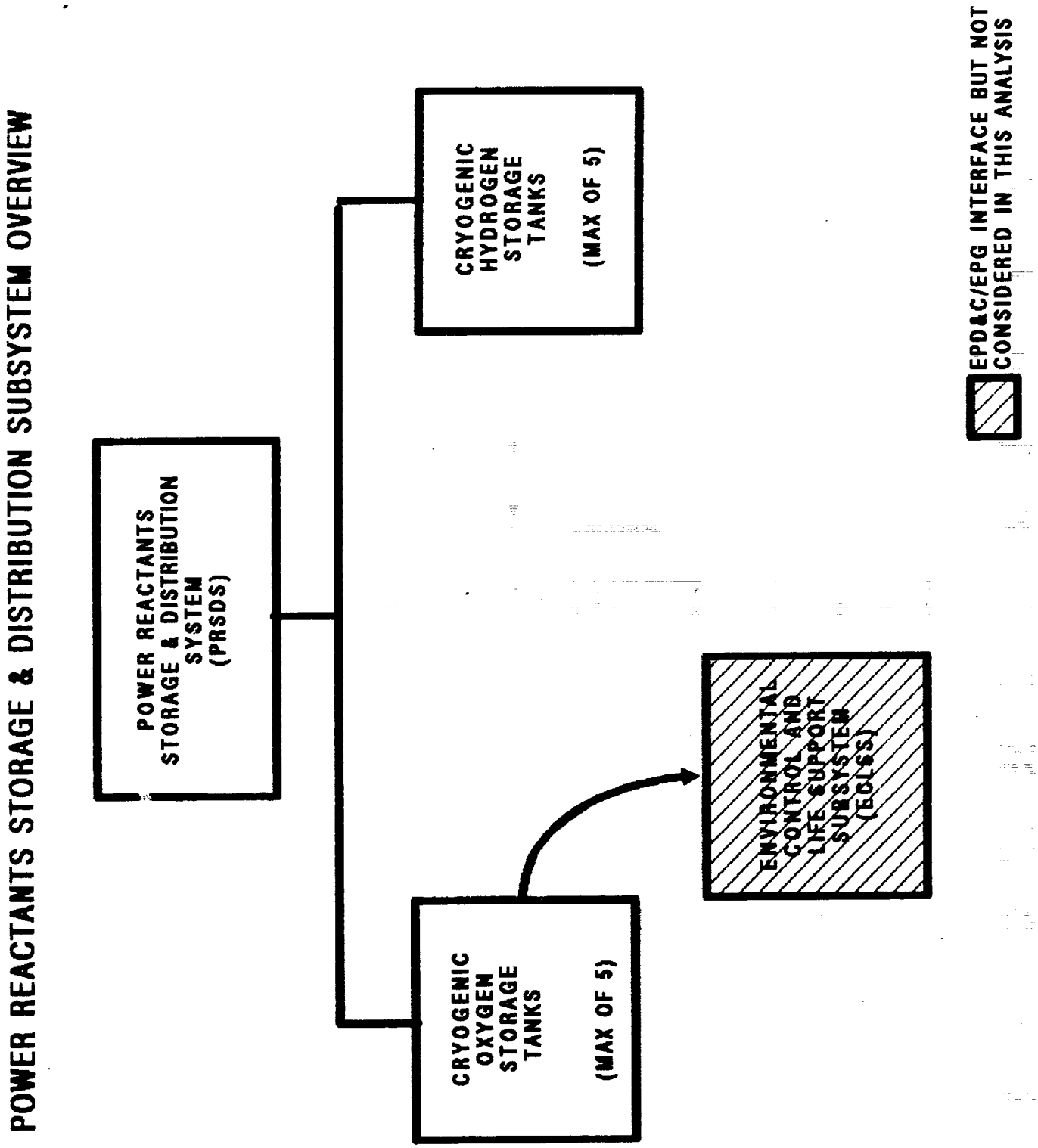


Figure 4 - PRSDS SUBSYSTEM OVERVIEW

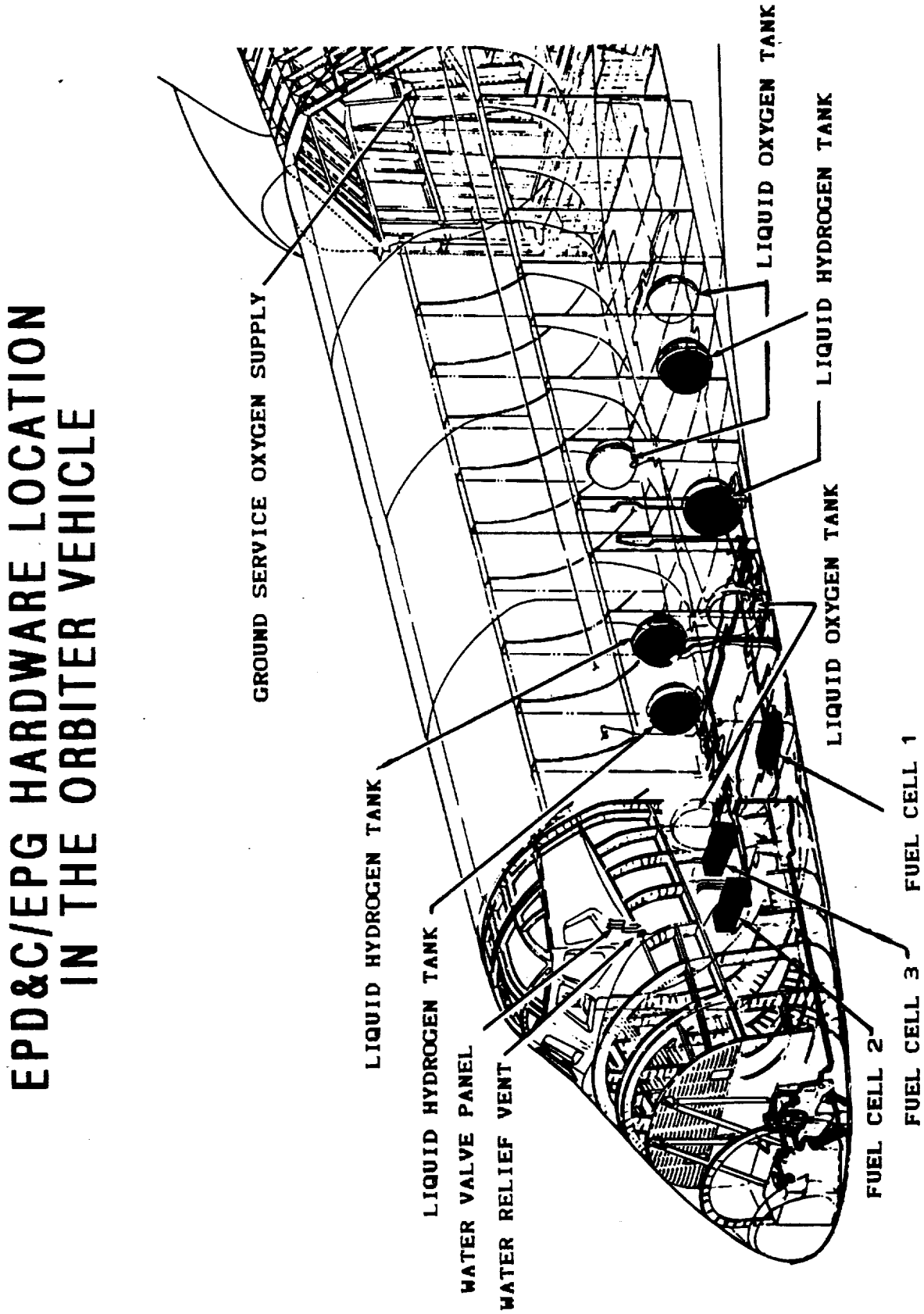


Figure 5 - EPD&C/EPG HARDWARE LOCATION IN THE ORBITER VEHICLE

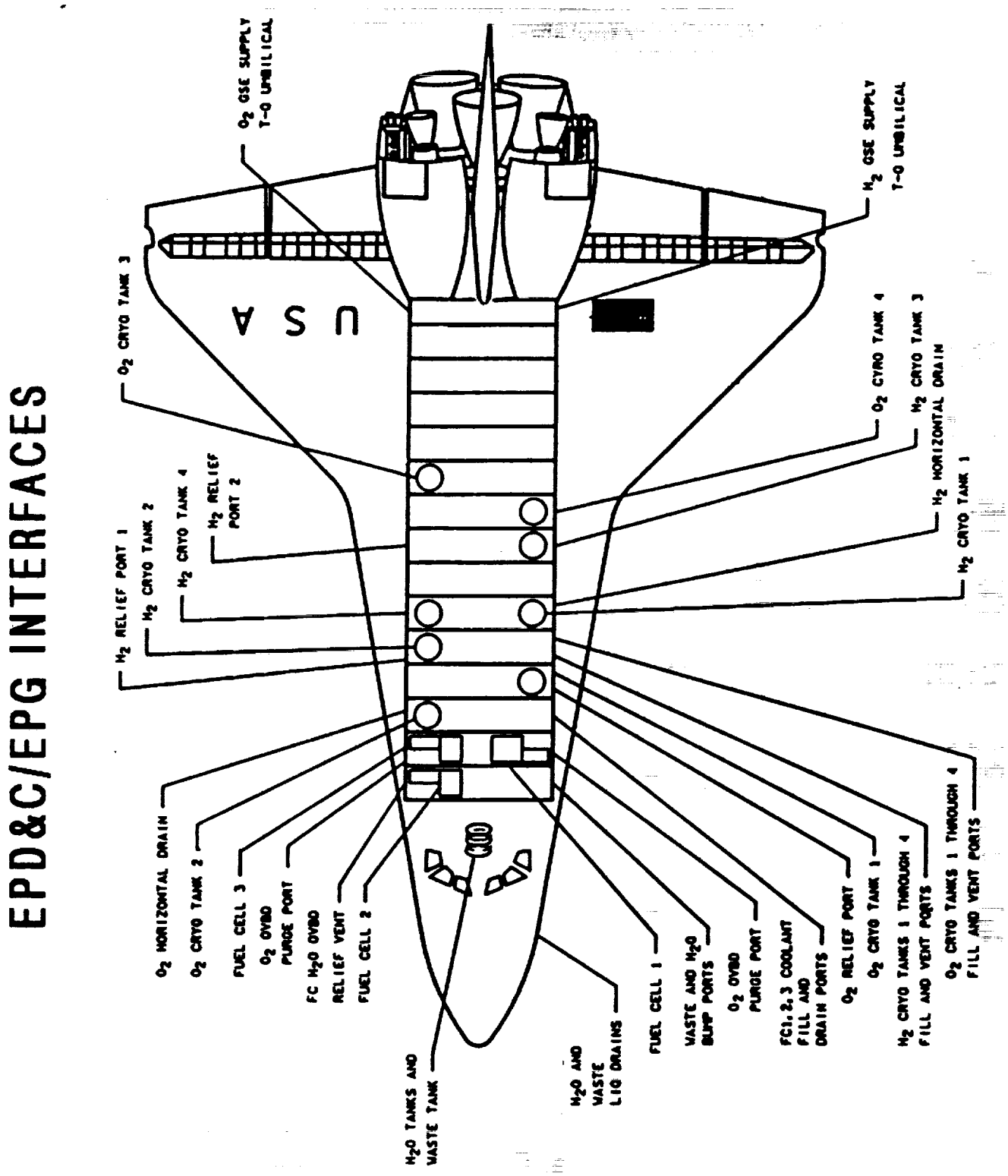


Figure 6 - EPD&C/EPG INTERFACES

4.0 ANALYSIS RESULTS

Detailed analysis results for each of the identified failure modes are presented in Appendix C. Table I presents a summary of the failure criticalities for each of the two major subdivisions of the EPD&C/EPG. Further discussion of each of these subdivisions and the applicable failure modes is provided in subsequent paragraphs.

TABLE I Summary of IOA Failure Modes and Criticalities

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
PSA :	-	2	-	11	1	39	53
RCS :	-	-	-	14	24	27	65
TCS :	-	3	-	1	-	9	13
WRS :	-	19	-	25	2	29	75
PRSDS :	4	12	-	34	-	6	56
TOTAL	4	36	-	85	27	110	262

Of the 262 failure modes analyzed, no single failures were determined to result in loss of crew or vehicle, and 60 were determined to result in loss of mission. A summary of the potential critical items is presented in Table II. Appendix D presents a cross reference between each potential critical item (PCI) and a specific worksheet in Appendix C.

TABLE II Summary of IOA Potential Critical Items

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
EPD&C/EPG :	4	36	-	18	2	60

4.1 Analysis Results - Power Section Assembly

The Power Section Assembly produces the electrical power necessary for the Orbiter vehicle operation. There are fifty-three failure modes identified for this division. Of these, two are criticality 2/1R, eleven are criticality 3/1R, one is criticality 3/2R, and thirty-nine are criticality 3/3. Three failures from the PSA are identified to be PCI's. These are listed in Appendix D.

4.2 Analysis Results - Reactant Control Subsystem

The Reactant Control Subsystem (RCS) provides the cryogenic reactants to the PSA at an acceptable pressure and temperature. There are sixty-five failure modes identified for this division. Of these, fourteen are criticality 3/1R, twenty-four are criticality 3/2R, and twenty-seven are criticality 3/3. Ten failures from the RCS are identified to be PCI's. These are listed in Appendix D.

4.3 Analysis Results - Thermal Control System

The Thermal Control System (TCS) controls operating temperatures and electrolyte concentration in the PSA. There are thirteen failure modes identified for this division. Of these, three are criticality 2/1R, one is criticality 3/1R, and nine are criticality 3/3. Three failures from the TCS are identified to be PCI`s. These are listed in Appendix D.

4.4 Analysis Results - Water Removal Subsystem

The Water Removal Subsystem (WRS) removes product water from the FCP during normal operation. There are seventy-five failure modes identified for this division. Of these, nineteen are criticality 2/1R, twenty-five are criticality 3/1R, two are criticality 3/2R, and twenty-nine are criticality 3/3. Twenty failures from WRS are identified to be PCI's. These are listed in Appendix D.

4.5 Analysis Results - Power Reactant Storage and Distribution System

The Power Reactant Storage and Distribution System (PRSDS) stores the cryogenic reactants for use in the FCP to produce electrical power. There are fifty-six failure modes identified for this division. Of these, four are criticality 1/1, twelve are criticality 2/1R, thirty-four are criticality 3/1R, and six are criticality 3/3. Twenty-four failures from PRSDS are identified to be PCI's. These are listed in Appendix D.

5.0 REFERENCES

Reference documentation available from NASA and Rockwell was used in the analysis. The documentation used included the following:

1. JSC-12820, PCN-1, STS Operational Flight Rules, 12-16-85

2. V45 File III, Operations and Maintenance Requirements and Specifications Document- Orbiter OMRSD- Electrical Power Generation/Power Reactant Storage and Distribution, 5-29-86

3. NSTS 22206, Instructions for Preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL), 10-10-86

4. 100-2G, Rockwell International Reliability Desk Instruction Flight Hardware FMEA and CIL, 1-31-84

5. Orbiter Fuel Cell Powerplant Review and Training Course, International Fuel Cells (IFC), 5-86

6. JSC-11174, Space Systems Handbook, Rev. C, DCN-5, 9-13-95

7. VS70-976102, Integrated System Schematic - Orbiter Vehicle OV-102 EPDC, Rev. F, 7-2-86

8. VS70-945099, Integrated System Schematic - Orbiter Vehicle OV-099, 103, & 104, Electrical Power Subsystem (EPS), 7-18-85

9. VS70-945102, Integrated System Schematic - Orbiter Vehicle OV-102, Electrical Power Subsystem (EPS), 9-19-84

10. Rockwell International Drawings

a. VS70-450212	CRYO Subsystem	OV-102, Flt 7 and subs
b. VS70-450209	CRYO Subsystem	OV-099, Flt 1-3 only
c. VS70-450202	CRYO Subsystem	OV-102, Flt 1-4 only
d. VS70-450222	CRYO Subsystem	OV-102, Flt 6
e. VS70-450219	CRYO Subsystem	OV-99, 103 Flt 4 and subs

APPENDIX A
ACRONYMS

AOA - Abort Once Around
ATO - Abort To Orbit
CIL - Critical Items List
CRIT - Criticality
C&W - Caution and Warning System
ECLSS - Environmental Control and Life Support System
EPD&C - Electrical Power Distribution and Control
EPG - Electrical Power Generation
FCP - Fuel Cell Powerplant
FC - Fuel Cell
FMEA - Failure Modes and Effects Analysis
FSSR - Flight System Software Requirement
GAS - Get Away Special
GPC - General Purpose Computer
GSE - Ground Support Equipment
HDC - Hybrid Driver Controller
IOA - Independent Orbiter Assessment
MDAC - McDonnell Douglas Astronautics Company
MDM - Multiplexer/Demultiplexer
NASA - National Aeronautics and Space Administration
NA - Not Applicable
NSTS - National Space Transportation System
OF - Operational Forward
OMRSD - Operational Maintenance Requirements and Specifications Document
PCA - Power Control Assembly
PCI - Potential Critical Item
PLS - Primary Landing Site
PSA - Power Section Assembly
PRCB - Program Requirements Control Board
PRSDS - Power Reactant Storage and Distribution System
RI - Rockwell International
RCS - Reactant Control Subsystem
RPC - Remote Power Controller
RTLS - Return To Landing Site
STS - Space Transportation System
TAL - Transatlantic Abort Landing
TCS - Thermal Control Subsystem
WRS - Water Removal Subsystem

APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.1 Definitions

Definitions contained in NSTS 22206, Instructions For Preparation of FMEA/CIL, 10 October 1986, were used with the following amplifications and additions.

INTACT ABORT DEFINITIONS:

RTLS - begins at transition to OPS 6 and ends at transition to OPS 9, post-flight

TAL - begins at declaration of the abort and ends at transition to OPS 9, post-flight

AOA - begins at declaration of the abort and ends at transition to OPS 9, post-flight

ATO - begins at declaration of the abort and ends at transition to OPS 9, post-flight

CREDIBLE (CAUSE) - an event that can be predicted or expected in anticipated operational environmental conditions. Excludes an event where multiple failures must first occur to result in environmental extremes

CONTINGENCY CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

EARLY MISSION TERMINATION - termination of onorbit phase prior to planned end of mission

EFFECTS/RATIONALE - description of the case which generated the highest criticality

HIGHEST CRITICALITY - the highest functional criticality determined in the phase-by-phase analysis

MAJOR MODE (MM) - major sub-mode of software operational sequence (OPS)

MC - Memory Configuration of Primary Avionics Software System (PASS)

MISSION - assigned performance of a specific Orbiter flight with payload/objective accomplishments including orbit phasing and altitude (excludes secondary payloads such as GAS cans, middeck P/L, etc.)

MULTIPLE ORDER FAILURE - describes the failure due to a single cause or event of all units which perform a necessary (critical) function

OFF-NOMINAL CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

OPS - software operational sequence

PRIMARY MISSION OBJECTIVES - worst case primary mission objectives are equal to mission objectives

PHASE DEFINITIONS:

PRELAUNCH PHASE - begins at launch count-down Orbiter power-up and ends at moding to OPS Major Mode 102 (liftoff)

LIFTOFF MISSION PHASE - begins at SRB ignition (MM 102) and ends at transition out of OPS 1 (Synonymous with ASCENT)

ONORBIT PHASE - begins at transition to OPS 2 or OPS 8 and ends at transition out of OPS 2 or OPS 8

DEORBIT PHASE - begins at transition to OPS Major Mode 301 and ends at first main landing gear touchdown

LANDING/SAFING PHASE - begins at first main gear touchdown and ends with the completion of post-landing safing operations

B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in NSTS 22206, Instructions for Preparation of FMEA/CIL, 10 October 1986, was employed with the following amplifications and additions.

1. The operational flight software is an accurate implementation of the Flight System Software Requirements (FSSRs).

   RATIONALE: Software verification is out-of-scope of this task.

2. After liftoff, any parameter which is monitored by system management (SM) or which drives any part of the Caution and Warning System (C&W) will support passage of Redundancy Screen B for its corresponding hardware item.

   RATIONALE: Analysis of on-board parameter availability and/or the actual monitoring by the crew is beyond the scope of this task.

3. Any data employed with flight software is assumed to be functional for the specific vehicle and specific mission being flown.

   RATIONALE: Mission data verification is out-of-scope of this task.

4. All hardware (including firmware) is manufactured and assembled to the design specifications/drawings.

   RATIONALE: Acceptance and verification testing is designed to detect and identify problems before the item is approved for use.

5. All Flight Data File crew procedures will be assumed performed as written, and will not include human error in their performance.

   RATIONALE: Failures caused by human operational error are out-of-scope of this task.

6. All hardware analyses will, as a minimum, be performed at the level of analysis existent within NASA/Prime Contractor Orbiter FMEA/CILs, and will be permitted to go to greater hardware detail levels but not lesser.

   RATIONALE: Comparison of IOA analysis results with other analyses requires that both analyses be performed to a comparable level of detail.

7. Verification that a telemetry parameter is actually monitored during AOS by ground-based personnel is not required.

   RATIONALE: Analysis of mission-dependent telemetry availability and/or the actual monitoring of applicable data by ground-based personnel is beyond the scope of this task.

8. The determination of criticalities per phase is based on the worst case effect of a failure for the phase being analyzed. The failure can occur in the phase being analyzed or in any previous phase, whichever produces the worst case effects for the phase of interest.

   RATIONALE: Assigning phase criticalities ensures a thorough and complete analysis.

9. Analysis of wire harnesses, cables and electrical connectors to determine if FMEAs are warranted will not be performed nor FMEAs assessed.

   RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

10. Analysis of welds or brazed joints that cannot be inspected will not be performed nor FMEAs assessed.

    RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

11. Emergency system or hardware will include burst discs and will exclude the EMU Secondary Oxygen Pack (SOP), pressure relief valves and the landing gear pyrotechnics.

    RATIONALE: Clarify definition of emergency systems to ensure consistency throughout IOA project.

B.3 EPD&C/EPG-Specific Ground Rules and Assumptions

1. Component age life will not be considered in the analysis.

   RATIONALE: Component age analysis is beyond the scope of this task.

2. An O2 cryo tank will be assumed lost if both heaters in one tank fail to function (i.e., neither heater will function with the delta current sensors enabled).

   RATIONALE: Systems failure definition. Flight rule definition.

3. An H2 cryo tank will be assumed lost if neither heater in one tank will function.

   RATIONALE: Systems failure definiton. Flight rule definition.

4. An impending loss of all cryo O2 or all cryo H2 tanks will be cause to exercise the highest-priority abort mode the loss/leak will allow.

   RATIONALE: Flight rule definition.

5. Continue nominal ascent if 2/3/4 O2 (H2) tanks fail when flying 3/4/5.

   Enter next PLS daily go/no-go if two O2 (H2) tanks fail during lift-off and on-orbit.

   RATIONALE: Flight rules go/no-go criteria.

6. A fuel cell will be considered failed if the following conditions exist.

   a. Coolant pump or H2 pump/H2O separator is lost.

   b. Coolant pressure >75 (71.4) PSIA and increasing.

   c. Fuel cell unable to discharge water to the ECLSS H2O storage tanks or overboard via the fuel cell H2O relief system.

   d. Fuel cell reactant valve fails closed.

   e. Cannot be connected to a main bus.

f. Fuel cell O2 reaction chambers cannot be purged.

g. Fuel cell end-cell heater failing on.

10. Loss of two fuel cells in the first stage of ascent is considered loss of life/vehicle.

RATIONALE: SRB loads are too high for one fuel cell to support. Voltage may go <25V which will shut down the GPC's.

11. Although the ECLSS product-water storage is a separate system from EPD&C/EPG, it will be considered as a failable redundant product-water relief line for purposes of the EPG functional criticality scenarios.

RATIONALE: This assumption violates general ground rule 2.3.2.d in NSTS 22206 but is essential for evaluating failures associated with the water relief line.

12. The start/sustaining heater on the left-hand FCP (FCP #1) is assumed to be disconnected. Thus, this FCP cannot be maintained operational at no-load, and will be considered shutdown if the load cannot be maintained at greater than 2 KW.

RATIONALE: Load needed to maintain operating temperature. RH FCP uses sustain heater to maintain temps at no-load.

13. For all "failed open" failure modes for valves which are normally open, redundancy screen B will be assumed failed.

RATIONALE: The failure is not detectable until the valve is required to be closed.

14. Five O2 and H2 tanks are being used as the baseline configuration under study.

RATIONALE: The configuration for all redundant components is being considered for this analysis.

15. Inadvertant Fuel Cell shutdown during RTLS and TAL abort is considered loss of crew/vehicle.

RATIONALE: Loss of FCP 1/Main Bus A is loss of OMS Engine Purge Capability (required for TAL) and Aft Compartment MPS Helium Purge capability (required for RTLS and TAL).

APPENDIX C
DETAILED ANALYSIS

This section contains the IOA analysis worksheets generated during the analysis of this subsystem. The information on these worksheets is intentionally similar to the NASA FMEAs. Each of these sheets identifies the hardware item being analyzed, and parent assembly, as well as the function. For each failure mode, the possible causes are outlined, and the assessed hardware and functional criticality for each mission phase is listed, as described in the NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. Finally, effects are entered at the bottom of each sheet, and the worst case criticality is entered 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: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2000

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

ITEM: SWITCH, FUEL CELL 1,2,3 START/STOP CONTROL
FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) SWITCH S16, S17, S18
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S16, 32V73A1A2S17, 32V73A1A2S18
PART NUMBER: ME452-0102-7355

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO START A FUEL CELL. MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF MISSION/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2001

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

ITEM: SWITCH, FUEL CELL 1,2,3 START/STOP CONTROL
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) SWITCH S16, S17, S18
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S16, 32V73A1A2S17, 32V73A1A2S18
PART NUMBER: ME452-0102-7355

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO SHUT DOWN ACTIVE FUEL CELL. ALTERNATE METHODS OF FCP SHUTDOWN AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2002

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

ITEM: RESISTORS, 5.1K, 1/4W
FAILURE MODE: ALL CREDIBLE MODES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A2R6, A2R7, A2R14, A2R3
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A1A2A2R6,R7,A2R14, R3
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2003

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

ITEM: RESISTORS, 1.2K
FAILURE MODE: ELEMENTS OPENS, H-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A1R35, A1R22, A2R13
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A1A2A1R35, 22, A2R13
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ABILITY TO START FCP OR RESTART A SHUTDOWN FCP, OR TO STOP AN ACTIVE FCP. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2004

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

ITEM: RESISTORS, 1.2K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A1R35, A1R22, A2R13
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A1A2A1R35, 22, A2R13
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2005

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

ITEM: RESISTORS, 1.2K
FAILURE MODE: ELEMENTS OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A1R4, A1R13, A2R10
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A1A2A1R4, R13, A2R10
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ABILITY TO START/STOP FCP. REDUNDANT FCP SHUTDOWN PATHS AVAILABLE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF SUFFICIENT ELECTRICAL POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2006

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

ITEM: RESISTORS, 1.2K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A1R4, A1R13, A2R10
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A1A2A1R4, R13, A2R10
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2007

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

ITEM: RESISTORS, 1.2K
FAILURE MODE: ELEMENTS OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A2R8, A1R17, A2R11
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2A2R8, A1R17, A2R11
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ABILITY TO START/STOP FCP. REDUNDANT FCP SHUTDOWN PATHS AVAILABLE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF SUFFICIENT ELECTRICAL POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2008

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

ITEM: RESISTORS, 1.2K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A2R8, A1R17, A2R11
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A1A2A2R8, A1R17, A2R11
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2009

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

ITEM: SWITCH, FUEL CELL 1,2 & 3 CONTROLLER
FAILURE MODE: FAILS TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 014, 015, 016
4) SWITCH S12, S11, S11
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A14S12, A15S11, A16S11
PART NUMBER: ME452-0102-7101

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF ASSOCIATED FUEL CELL; LOSS OF REDUNDANCY AT FCP LEVEL.
POSSIBLE LOSS OF CREW/VEHICLE DUE TO LACK OF ADEQUATE POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2010

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

ITEM: SWITCH, FUEL CELL 1,2 & 3 CONTROLLER
FAILURE MODE: SHORTS, INADVERTANTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 014, 015, 016
4) SWITCH S12, S11, S11
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A14S12, A15S11, A16S11
PART NUMBER: ME452-0102-7101

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 2/1R
MDAC ID: 2011 ABORT: 2/1R

ITEM: RESISTORS 1.2K
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 014, 015, 016
4) RESISTOR A5R1, A5R1, A6R1
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A14A5R1, A15A5R1, A16A6R1
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ASSOCIATED FUEL CELL. LOSS OF REDUNDANCY AT FCP LEVEL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LACK OF ADEQUATE POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2012

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

ITEM: RESISTORS 1.2K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 014, 015, 016
4) RESISTOR A5R1, A5R1, A6R1
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A14A5R1, A15A5R1, A16A6R1
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2013

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

ITEM: SWITCH, FUEL CELL NO 1 START UP HEATER
FAILURE MODE: ALL CREDIBLE FAILURES.

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S6
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A12A1S6
PART NUMBER: ME452-0102-7101

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE. (START UP HEATER DISCONNECTED ON FCP 1.)

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2014

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

ITEM: SWITCH, FC NO 2,3, STARTUP HEATER
FAILURE MODE: FAILS TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S7, S8
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S7,S8
PART NUMBER: ME452-0102-7101

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO INHIBIT A FCP HEATER. EVENTUAL LOSS OF FCP AND POSSIBLE LOSS OF CREW/VEHICLE WITH MULTIPLE FCP FAILURES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2015

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

ITEM: SWITCH, FC NO 2,3, STARTUP HEATER
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S7, S8
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S7,S8
PART NUMBER: ME452-0102-7101

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO INHIBIT A FCP HEATER. EVENTUAL LOSS OF FCP DUE TO OVER TEMP. POSSIBLE LOSS OF CREW/VEHICLE WITH MULTIPLE FAILURES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2016

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

ITEM: RESISTOR, 1.2K
FAILURE MODE: ALL CREDIBLE MODES.

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A6R1
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A12A1A6R2
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE (STARTUP HEATER DISCONNECTED ON FCP 1).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2017

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

ITEM: RESISTOR, 1.2K
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTORS A7R1, A8R1
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 32V73A12A1A7R1, A8R1
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
PROVIDES CURRENT PROTECTION FROM CONT BUS'S TO FCP'S. LOSS OF STARTUP HEATING OF FCP AND POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2018

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

ITEM: RESISTOR, 1.2K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTORS A7R1, A8R1
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A12A1A7R1, A8R1
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2019

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

ITEM: RESISTOR, 5.1K, 1/4W
FAILURE MODE: ALL CREDIBLE MODES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTORS A6R2, A7R2, A8R2
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A12A1A6R2, A7R2, A8R2
PART NUMBER: RLR07C512GR

CAUSES: OPEN, SHORT, PARAMETER DEVIATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2020

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

ITEM: RESISTOR, 5.1K, 1/4W
FAILURE MODE: ALL CREDIBLE MODES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) RESISTORS A2R3, A2R8, A2R9
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A1A2A2R3, A2R8, A2R9
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2021

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

ITEM: RESISTOR, 1.2K
FAILURE MODE: ALL CREDIBLE MODES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) RESISTORS A1R14, A1R14, A1R13
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A25A1R14, 6A1R14, 7A1R13
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE (LOSS OF MEASUREMENT ONLY).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2022

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

ITEM: DIODE, ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) DIODES A1CR9, 10, 10, 9, 10, 9
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25A1CR9, 10 (REF)
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ABILITY FOR VEHICLE COMMANDS TO CONTROL START POWER TO ASSOCIATED FCP. REDUNDANCY AT SUBSYTEM LEVEL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO MULTIPLE FCP FAILURES.

REFERENCES: ALSO DIODES 40V76A26A1CR10, A1CR9 AND 40V76A27A1CR10, A1CR9

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2023

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

ITEM: DIODE, ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) DIODES A1CR9, 10, 10, 9, 10, 9
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A25A1CR9, 10 (REF)
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO DIODES 40V76A26A1CR10, A1CR9 AND 40V76A27A1CR10, A1CR9

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2024

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR9, AR8, AR8
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR9, AR8, AR8
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR9, 6AR8, 7AR8
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF VEHICLE COMMANDS TO HDC TO START ASSOCIATED FCP. REDUNDANCY AT SUBSYSTEM LEVEL. POSSIBLE LOSS OF CREW/VEHICLE AFTER LOSS OF MULTIPLE FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2025

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR9, AR8, AR8
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR9, AR8, AR8
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A25AR9, 6AR8, 7AR8
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2026

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

ITEM: DIODE, ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1
4) DIODES A1CR11, 12, 13, 14
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A25A1CR11, 12, 13, 14
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2027

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

ITEM: DIODE, ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1
4) DIODES A1CR11, 12, 13, 14
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A25A1CR11, 12, 13, 14
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2028

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

ITEM: DIODE, ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA-2
4) DIODES A1CR14, 13, 12, 11
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A26A1CR14, 13, 12, 11
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2029

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

ITEM: DIODE, ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA-2
4) DIODES A1CR14, 13, 12, 11
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A26A1CR14, 13, 12, 11
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2030

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

ITEM: DIODE, ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA-3
4) DIODES A1CR14, 13, 12, 11
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A27A1CR14, 13, 12, 11
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2031

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

ITEM: DIODE, ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA-3
4) DIODES A1CR14, 13, 12, 11
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V76A27A1CR14, 13, 12, 11
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2032 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, TYPE 1, AR10, 11, 9, 10, 9, 10
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR10, 11, 9, 10, 9, 10
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR10, 11 (REF)
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF VEHICLE COMMAND AND MANUAL CAPABILITY (SWITCH S16) TO STOP ASSOCIATED FCP. REDUNDANCY AT CIRCUIT LEVEL.

REFERENCES: 40V76A26AR9, AR10, 40V76A27AR9, AR10

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2033

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE 1, AR10, 11, 9, 10, 9, 10
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR10, 11, 9, 10, 9, 10
5)
6)
7)
8) PSA
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR10, 11 (REF)
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF VEHICLE COMMAND AND MANUAL CAPABILITY (SWITCH S16) TO STOP ASSOCIATED FCP. REDUNDANT HDC INHIBITS FCP SHUTDOWN.

REFERENCES: 40V76A26AR9, AR10, 40V76A27AR9, AR10

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2034

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

ITEM: EVENT INDICATOR, FC READY FOR LOAD
FAILURE MODE: ANY CREDIBLE FAILURE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) EVENT INDICATOR DS11, 12, 13
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A1A2DS11, 12, 13
PART NUMBER: MC432-0222-0027

CAUSES: VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE, LOSS OF INPUT

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2035

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

ITEM: EVENT INDICATOR, FC COOLANT PUMP DELTA P
FAILURE MODE: ANY CREDIBLE FAILURE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R1A2
4) EVENT INDICATOR DS14, 15, 16
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A1A2DS14, 15, 16
PART NUMBER: MC432-0222-0027

CAUSES: VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE, LOSS OF INPUT

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2036

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

ITEM: EVENT INDICATOR, FC GPC PURGE SEQ DS1
FAILURE MODE: ANY CREDIBLE FAILURE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) EVENT INDICATOR DS1
5)
6)
7)
8) PSA
9) 05-6MA

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: 32V73A12A1DS1
PART NUMBER: MC432-0222-0027

CAUSES: VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE, LOSS OF INPUT

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2037

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

ITEM: SWITCH, TOGGLE SELECTOR, FCP TEMP.
FAILURE MODE: FAILS TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 01, 02, 03
4) SWITCH S3
5)
6)
7)
8) PSA
9) 05-6MA

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: 33V73A1S3
PART NUMBER: ME452-0102-7106

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2038

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

ITEM: SWITCH, TOGGLE SELECTOR, FCP TEMP.
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 01, 02, 03
4) SWITCH S3
5)
6)
7)
8) PSA
9) 05-6MA

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: 33V73A1S3
PART NUMBER: ME452-0102-7106

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2039

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

ITEM: METER, FCP STACK OUTLET COOLANT TEMP
FAILURE MODE: PEGS HIGH OR LOW

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 01, 02, 03
4) METER, M4
5)
6)
7)
8) PSA
9) 05-6MA

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: 33V73A1M4
PART NUMBER: MC432-0238-0019

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2040

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

ITEM: METER, FCP STACK OUTLET COOLANT TEMP
FAILURE MODE: PARAMETER DEVIATION

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL 01, 02, 03
4) METER, M4
5)
6)
7)
8) PSA
9) 05-6MA

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: 33V73A1M4
PART NUMBER: MC432-0238-0019

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2041

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

ITEM: SIGNAL CONDITIONER NO. 1
FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER NO. 1 DSC OM1
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V75A23
PART NUMBER: V070-754161

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2042

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

ITEM: SIGNAL CONDITIONER NO. 1
FAILURE MODE: ZERO OUTPUT WITH RECORD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER NO. 1 DSC OM1
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V75A23
PART NUMBER: V070-754161

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2043

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

ITEM: SIGNAL CONDITIONER NO. 1
FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER NO. 1 DSC OM1
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V75A23
PART NUMBER: V070-754161

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2044

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

ITEM: SIGNAL CONDITIONER NO. 2
FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER NO. 2 DSC OM2
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V75A74
PART NUMBER: V070-754162

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2045

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

ITEM: SIGNAL CONDITIONER NO. 2
FAILURE MODE: ZERO OUTPUT WITH REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER NO. 2 DSC OM2
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V75A74
PART NUMBER: V070-754162

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2046

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

ITEM: SIGNAL CONDITIONER NO. 2
FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER NO. 2 DSC OM2
5)
6)
7)
8) PSA
9) 05-6MA

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: 40V75A74
PART NUMBER: V070-754162

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2047

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

ITEM: SIGNAL CONDITIONER DSC OF3
FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER DSC OF3
5)
6)
7)
8) PSA
9) 05-6MA

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: 83V75A18
PART NUMBER: V070-753263

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2048

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

ITEM: SIGNAL CONDITIONER DSC OF3
FAILURE MODE: ZERO OUTPUT WITH REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER DSC OF3
5)
6)
7)
8) PSA
9) 05-6MA

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: 83V75A18
PART NUMBER: V070-753263

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2049

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

ITEM: SIGNAL CONDITIONER DSC OF3
FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER DSC OF3
5)
6)
7)
8) PSA
9) 05-6MA

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: 83V75A18
PART NUMBER: V070-753263

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2050

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

ITEM: SIGNAL CONDITIONER DSC OA2
FAILURE MODE: FULL OUTPUT WITHOUT REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER DSC OA2
5)
6)
7)
8) PSA
9) 05-6MA

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: 55V75A20
PART NUMBER: V070-755262

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2051

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

ITEM: SIGNAL CONDITIONER DSC OA2
FAILURE MODE: ZERO OUTPUT WITH REGARD TO INPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER DSC OA2
5)
6)
7)
8) PSA
9) 05-6MA

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: 55V75A20
PART NUMBER: V070-755262

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2052

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

ITEM: SIGNAL CONDITIONER DSC OA2
FAILURE MODE: OUT OF TOLERANCE, OUTPUT HIGH OR LOW

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID BODY
4) SIGNAL CONDITIONER DSC OA2
5)
6)
7)
8) PSA
9) 05-6MA

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: 55V75A20
PART NUMBER: V070-755262

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2053 ABORT: 3/1R

ITEM: SWITCH, FUEL CELL GPC PURGE SEQ
FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S1
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S1
PART NUMBER: ME452-0102-7102

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: INITIATES AUTO-PURGE SEQUENCE CYCLE THROUGH GPC AND CONDUCTS POWER TO MDM PF2.
EFFECTS: LOSS OF ABILITY TO AUTOMATICALLY PURGE FUEL CELL THROUGH THE GPC. MANUAL FC PURGE AVAILABLE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2054

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

ITEM: SWITCH, FUEL CELL GPC PURGE SEQ
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S1
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1S1
PART NUMBER: ME452-0102-7102

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: INITIATES AUTO-PURGE SEQUENCE CYCLE THROUGH GPC AND CONDUCTS POWER TO MDM PF2.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2055

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

ITEM: RESISTOR, 5.1K 1/4 W
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A1R2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1A1R2
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 3AB TO FC GPC PURGE SEQ SWITCH (S1).
EFFECTS: LOSS OF PWR TO GPC PURGE SEQ SWITCH WHICH THEN WILL REQUIRE MANUAL PURGE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2056

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

ITEM: RESISTOR, 5.1K 1/4 W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A1R2
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A1R2
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 3AB TO FC GPC PURGE SEQ SWITCH (S1).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2057 ABORT: 3/1R

ITEM: SWITCH, FUEL CELL PURGE HEATER
FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S2
PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: PROVIDES THE ABILITY TO HEAT AUTOMATIC PURGE LINE BY GPC IN CONJUNCTION WITH S1 IN "GPC" POSITION OR MANUALLY IN "ON" POSITION.
EFFECTS: LOSS OF FC PURGE HTRS. POSSIBLE LOSS OF ABILITY TO PURGE FC'S. POSSIBLE MISSION LOSS DUE TO DEGREDATION OF FC PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2058

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

ITEM: SWITCH, FUEL CELL PURGE HEATER
FAILURE MODE: SHORTS, INADVERTANTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S2
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1S2
PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: PROVIDES THE ABILITY TO HEAT AUTOMATIC PURGE LINE BY GPC IN CONJUNCTION WITH S1 IN "GPC" POSITION OR MANUALLY IN "ON" POSITION.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2059

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

ITEM: RESISTOR, 5.1K 1/4 W
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A2R2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1A2R2
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 2CA TO FC PURGE HTR SWITCH S2 AND MDM OF4.
EFFECTS: LOSS OF FC PURGE HTR POWER AND ABILITY TO SAFELY PURGE FC'S. POSSIBLE LOSS OF MISSION DUE TO DEGREDATION OF FC PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2060

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

ITEM: RESISTOR, 5.1K 1/4 W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A2R2
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A2R2
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN ESS BUS 2CA TO FC PURGE HTR SWITCH S2 AND MDM OF4.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2061

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

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A1R3
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A1R3
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS CA1 AND FC PURGE HTR SWITCH (S2).
EFFECTS: LOSS OF ABILITY TO POWER PURGE HTRS CONTROLLED BY SWITCH (S2). POSSIBLE LOSS OF MISSION DUE TO DEGRADED FC PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2062

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

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A1R3
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A1R3
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS CA1 AND FC PURGE HTR SWITCH (S2).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2063

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

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A2R3
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A2R3
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS BC1 AND FC PURGE HTR SWITCH (S2).
EFFECTS: LOSS OF ABILITY TO POWER PURGE HTRS CONTROLLED BY SWITCH (S2). POSSIBLE LOSS OF MISSION DUE TO DEGRADED FC PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2064

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

ITEM: RESISTOR, 1.2K 2W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A2R3
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A2R3
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN CONT BUS BC1 AND FC PURGE HTR SWITCH (S2).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2065

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

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A2R1, A1R1
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1A2R1 32V73A12A1A1R1
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN FC PURGE HTR SWITCH (S2) AND MDM OF4 AND FC GPC PURGE SEQ FLAG (DS1) AND MDM OF4.
EFFECTS: LOSS OF ABILITY TO DO GPC AUTO PURGE FOR FC. MAY RESULT IN FC DEGREDATION AND CAUSE MISSION LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2066

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

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A2R1, A1R1
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A2R1 32V73A12A1A1R1
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION BETWEEN FC PURGE HTR SWITCH (S2) AND MDM OF4 AND FC GPC PURGE SEQ FLAG (DS1) AND MDM OF4.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/2R
MDAC ID: 2067 ABORT: 3/2R

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) RPC-25
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25RPC25
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS MAIN A PWR TO STANDBY HEATERS OF PURGE LINE HTRS WHEN SWITCH S2 IN "ON" POSITION.
EFFECTS: LOSS OF STANDBY HTRS OF O2 AND H2 PURGE LINES. ALTERNATE PATHS TO POWER HTRS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2068

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

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) RPC-25
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A25RPC25
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS MAIN A PWR TO STANDBY HEATERS OF PURGE LINE HTRS WHEN SWITCH S2 IN "ON" POSITION.
EFFECTS: NONE.

REFERENCES:

C-2

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/2R
MDAC ID: 2069 ABORT: 3/2R

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTANTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) RPC-14
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A27RPC14
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
EFFECTS: LOSS OF PRIMARY HTRS OF O2 AND H2 PURGE LINE. ALTERNATE PATHS TO POWER HTRS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2070

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

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) RPC-14
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A27RPC14
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/2R
MDAC ID: 2071 ABORT: 3/2R

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) RPC-15
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A27RPC15
PART NUMBER: MC450-0017-1050

CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
EFFECTS: LOSS OF PRIMARY HTRS OF O2 AND H2 PURGE LINE. ALTERNATE PATHS TO POWER HTRS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2072

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

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) RPC-15
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A27RPC15
PART NUMBER: MC450-0017-1050

CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2073

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

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) RPC-26
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26RPC26
PART NUMBER: MC450-0017-1050

CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
EFFECTS: LOSS OF PRIMARY HTRS OF O2 AND H2 PURGE LINE. ALTERNATE PATHS TO POWER HTRS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2074

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

ITEM: REMOTE POWER CONTROLLER, 5 AMP
FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) RPC-26
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A26RPC26
PART NUMBER: MC450-0017-1050

CAUSES: THERMAL STRESS, VIBRATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2075

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

ITEM: DIODE, ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) DIODES A2CR9, A2CR10
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [F] C [P]

LOCATION: 40V76A25A2CR9, 40V76A25A2CR10
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: POSSIBLE LOSS OF MISSION DUE TO INABILITY FOR BOTH REDUNDANT PATHS TO PURGE FC.
EFFECTS: LOSS OF ABILITY TO MONITER RPC GPC PURGE STATUS. ALTERNATE METHODS OF MONITERING PURGE AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2076

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

ITEM: DIODE, ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) DIODES A2CR9, A2CR10
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A25A2CR9, 40V76A25A2CR10
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2077

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

ITEM: RESISTOR, 2.2K & 1.8K
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1, PCA-3
4) RESISTOR A1R8, A1R7
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A25A1R8,A1R7 40V76A27A1R8,A1R7
PART NUMBER: RLR07C182GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2078

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

ITEM: RESISTOR, 2.2K & 1.8K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) RESISTOR A1R8, A1R7
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A25A1R8,A1R7 40V76A27A1R8,A1R7
PART NUMBER: RLR07C182GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/3
MDAC ID: 2079 ABORT: 3/3

ITEM: RESISTOR, 2.2K & 1.8K
FAILURE MODE: ELEMENTS OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2, PCA-3
4) RESISTORS A1R12, A1R11, A1R10, A1R9
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A26A1R12, A1R11 40V76A26A1R10, A1R9
PART NUMBER: RLR07C182GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2080

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

ITEM: RESISTOR, 2.2K & 1.8K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2, PCA-3
4) RESISTORS A1R12, A1R11, A1R10, A1R9
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A26A1R12, A1R11 40V76A27A1R10, A1R9
PART NUMBER: RLR07C182GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2081

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

ITEM: DIODE, ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) DIODES A2CR11, A2CR12
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [F] C [P]

LOCATION: 40V76A26A2CR11, 40V76A26A2CR12
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO MONITER RPC GPC PURGE STATUS. ALTERNATE METHODS TO MONITER STATUS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2082

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

ITEM: DIODE, ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) DIODES A2CR11, A2CR12
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A26A2CR11, 40V76A26A2CR12
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2083

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) FUSE F15
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26F15
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
LOSS OF MONITERING OF HEATER STATUS WHEN GPC AUTO PURGE IS SELECTED. ALTERNATE METHODS TO MONITER STATUS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2084

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

ITEM: CIRCUIT BREAKER, FC #1 THERMAL
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL L4
4) CB65, CB66, CB67
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 31V73A4CB65, 31V73A4CB66, 31V73A4CB67
PART NUMBER: MC454-0026-2030

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:
FAILURE OF PUMP MOTOR. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF NECESSARY POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/2R
MDAC ID: 2085 ABORT: 3/2R

ITEM: SWITCH, FUEL CELL PURGE VALVES
FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S3, S4, S5
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S3, 32V73A12A1S4, 32V73A12A1S5
PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
REDUNDANCY IN CIRCUIT LEVEL SO ADDITIONAL FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2086

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

ITEM: SWITCH, FUEL CELL PURGE VALVES
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S3, S4, S5
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S3, 32V73A12A1S4, 32V73A12A1S5
PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
CONTINUOUS PURGE OF FC CAUSING POSSIBLE DEGRADED FUEL CELL PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2087

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

ITEM: RESISTORS, 1.2 KOHM, 2W
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A3R1, A3R2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A3R1, 32V73A12A1A3R2
PART NUMBER: RWR80S1211FR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF MANUAL PURGE CAPABILITY OF FC 1. DEGRADATION OF FCP PERFORMANCE AND POSSIBLE LOSS OF FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2088

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

ITEM: RESISTORS, 1.2 KOHM, 2W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORTS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A3R1, A3R2
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A3R1, 32V73A12A1A3R2
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2089

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

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

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A3R3
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A3R3
PART NUMBER: RLR07C512GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
CONDUCTS VEHICLE COMMANDS TO FC 1 PURGE VALVE SWITCH S3 FROM MDM-OF4. POSSIBLE LOSS OF MISSION DUE TO DEGRADED FCP PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/3
MDAC ID: 2090 ABORT: 3/3

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORTS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A3R3
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A3R3
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/2R
MDAC ID: 2091 ABORT: 3/2R

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR1, AR2
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR1, AR2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR1, 40V76A25AR2
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF REMOTE CONTROL OF POWER TO O2 AND H2 PURGE VALVES OF FCP 1 WHEN S3 IN "GPC" POSITION. ADDITIONAL PATHS AVAILABLE TO POWER VALVE SWITCH HDC.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2092

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR1, AR2
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR1, AR2
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A25AR1, 40V76A25AR2
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2093

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR3, AR4
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR3, AR4
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR3, 40V76A25AR4
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF REMOTE POWER APPLICATION TO THE O2 AND H2 PURGE VALVES FOR FC 1. POSSIBLE DEGRADED FC PERFORMANCE AND EVENTUAL LOSS OF FCP, RESULTING IN LOSS OF MISSION AND/OR CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2094

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR3, AR4
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR3, AR4
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25AR3, 40V76A25AR4
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
CONTINUOUS OPEN OF O2 AND H2 PURGE VALVE OF FC 1 CAUSING DEGRADATION OF FCP OUTPUT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2095

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

ITEM: CIRCUIT BREAKER, FC #2 THERMAL
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL L4
4) CB68, CB69, CB70
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 31V73A4CB68, 31V73A4CB69, 31V73A4CB70
PART NUMBER: MC454-0026-2030

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:
PUMP MOTOR WILL FAIL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF NECESSARY POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2096

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

ITEM: RESISTORS, 1.2 KOHM, 2W
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A4R1, A4R2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A4R1, 32V73A12A1A4R2
PART NUMBER: RWR80S1211FR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF MANUAL PURGE CAPABILITY OF FC 2. DEGRADATION OF FCP PERFORMANCE AND POSSIBLE LOSS OF FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2097

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

ITEM: RESISTORS, 1.2 KOHM, 2W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORTS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A4R1, A4R2
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A4R1, 32V73A12A1A4R2
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2098

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

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

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A4R3
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A4R3
PART NUMBER: RLR07C512GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
CONDUCTS VEHICLE COMMANDS TO FC 2 PURGE VALVE SWITCH S4 FROM MDM-OF4. POSSIBLE LOSS OF MISSION DUE TO DEGRADED FCP PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2099

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

ITEM: RESISTOR, 5.1K 1/4W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORTS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A4R3
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A4R3
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2100

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR1, AR2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26AR1, 40V76A26AR2
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF REMOTE CONTROL OF POWER TO O2 AND H2 PURGE VALVES OF FCP 2 WHEN S4 IS IN "GPC" POSITION. ALTERNATE PATHS AVAILABLE TO POWER HDC.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2101

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR1, AR2
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A26AR1, 40V76A26AR2
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2102

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR3, AR4
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26AR3, 40V76A26AR4
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF POWER TO O2 AND H2 PURGE VALVE OPERATION WHEN FCP PURGE VALVE SWITCH S4 IS IN OPEN POSITION. DEGRADATION OF FCP OUTPUT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/2R
MDAC ID: 2103 ABORT: 3/2R

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR3, AR4
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26AR3, 40V76A26AR4
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
CONTINUOUS OPEN OF O2 AND H2 PURGE VALVE OF FCP 2 CAUSING DEGRADATION OF FCP OUTPUT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2104

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

ITEM: CIRCUIT BREAKER, FC #3 THERMAL
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL L4
4) CB71, CB72, CB73
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 31V73A4CB71, 31V73A4CB72, 31V73A4CB73
PART NUMBER: MC454-0026-2030

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK

EFFECTS/RATIONALE:
PUMP MOTOR WILL FAIL. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF NECESSARY POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2105

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

ITEM: RESISTORS, 1.2 KOHM, 2W
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A5R1, A5R2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A5R1, 32V73A12A1A5R2
PART NUMBER: RWR80S1211FR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF MANUAL PURGE CAPABILITY OF FC 3. DEGRADATION OF FCP PERFORMANCE AND POSSIBLE LOSS OF FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2106

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

ITEM: RESISTORS, 1.2 KOHM, 2W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A5R1, A5R2
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A5R1, 32V73A12A1A5R2
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2107

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

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

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A5R3
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 32V73A12A1A5R3
PART NUMBER: RLR07C512GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
CONDUCTS VEHICLE COMMANDS TO FC 3 PURGE VALVE SWITCH S4 FROM MDM-OF4. POSSIBLE LOSS OF MISSION DUE TO DEGRADED FCP PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2108

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

ITEM: RESISTOR, 5.1K, 1/4W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST, SHORT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTOR A5R3
5)
6)
7)
8) RCS
9) 05-6MA

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: 32V73A12A1A5R3
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2109

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR1, AR2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A27AR1, 40V76A27AR2
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF REMOTE CONTROL OF POWER TO O2 AND H2 PURGE VALVES OF FCP 3 WHEN S5 IS IN "GPC" POSITION. ALTERNATE POWER PATHS AVAILABLE TO POWER HDC.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2110

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR1, AR2
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR1, AR2
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A27AR1, 40V76A27AR2
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2111

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR3, AR4
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A27AR3, 40V76A27AR4
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF POWER TO O2 AND H2 PURGE VALVE OPERATION WHEN FCP PURGE VALVE SWITCH S5 IS IN OPEN POSITON. DEGRADATION OF FCP OUTPUT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2112

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR3, AR4
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR3, AR4
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A27AR3, 40V76A27AR4
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
CONTINUOUS OPEN OF O2 AND H2 PURGE VALVE OF FCP 3. POSSIBLE DEGRADATION OF FCP OUTPUT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2113

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1, PCA-2, PCA-3
4) FUSE F1, F1, F1
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25F1, 40V76A26F1, 40V76A27F1
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
LOSS OF INPUT POWER (MAIN C) TO GPC AUTO PATH OF PURGE HDC. DEGRADATION OF FCP PERFORMANCE AND POSSIBLE LOSS OF FCP AND CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2114

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1, PCA-2, PCA-3
4) FUSE F2, F2, F2
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25F2, 40V76A25F2, 40V76A25F2
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
LOSS OF INPUT POWER (MAIN C) TO GPC AUTO PATH OF PURGE HDC. DEGRADATION OF FCP PERFORMANCE. POSSIBLE LOSS OF FCP AND CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2115

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

ITEM: FUSES, H2 AND O2 FLOWMETER PROTECTION
FAILURE MODE: OPEN, INADVERTANTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA 1, 2, 3
4) FUSE F11, F44, F6, F7, F6, F7
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25F7, F8, 6F6, 6F7, 7F6, 7F7
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO MONITOR REACTANT FLOW RATES. POSSIBLE LOSS OF CREW/ VEHICLE DUE TO LOSS OF ALL ELECTRICAL POWER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2116

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

ITEM: DIODES, GSE AND VEHICLE ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA 1, 2, 3
4) DIODES, CR5, CR6, CR7, CR8
5)
6)
7)
8) RCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25A1CR5, 6, 7, 8, (REF)
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO DRIVE FCP PURGE VALVES DURING MANUAL PURGE VALVE OPERATION. POSSIBLE LOSS OF CREW/VEHICLE DUE TO DEGRADATION OF FCP AND LOSS OF NECESSARY ELECTRICAL POWER.

REFERENCES: ALSO DIODES 40V76A26A1CR5, 6, 7, 8, 7A1CR5, 6, 7, 8

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2117

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

ITEM: DIODES, GSE AND VEHICLE ISOLATION
FAILURE MODE: SHORT, INTERNAL SHORT, (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA 1, 2, 3
4) DIODES, CR5, CR6, CR7, CR8
5)
6)
7)
8) RCS
9) 05-6MA

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: 40V76A25A1CR5, 6, 7, 8, (REF)
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NONE

REFERENCES: ALSO DIODES 40V76A26A1CR5, 6, 7, 8, 7A1CR5, 6, 7, 8

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2118

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN, INADVERTENTLY OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) FUSE F6, F5, F3
5)
6)
7)
8) TCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25F6, 6F5, 7F3
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
CONDUCTS INPUT POWER TO ASSOCIATED FCP CONTROL POWER CIRCUIT. LOSS OF POWER TO FC COOLANT PUMP. DEGRADATION OF FC PERFORMANCE AND POSSIBLE LOSS OF CREW/VEHICLE AFTER MULTIPLE FC FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2119

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

ITEM: RESISTOR, 5.1K, 1/4W
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) RESISTORS A1R27, A1R25, A1R26
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25A1R27 (REF)
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO RESISTORS 40V76A26A1R25, 40V76A27A1R26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2120

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

ITEM: RESISTOR, 5.1K, 1/4W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) RESISTORS A1R27, A1R25, A1R26
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25A1R27 (REF)
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO RESISTORS 40V76A26A1R25, 40V76A27A1R26

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2121

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR8, AR7, AR7
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTANT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR8, AR7, AR7
5)
6)
7)
8) TCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR8, 6AR7, 7AR7
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF FCP VOLTAGE TO COOLANT PUMP AND H2 PUMP, RESULTING IN FCP FAILURE. POSSIBLE LOSS OF CREW/VEHICLE WITH ONE ADDITIIONAL FCP FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2122

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE III, AR8, AR7, AR7
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR8, AR7, AR7
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25AR8, 6AR7, 7AR7
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2123

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

ITEM: DIODE, BLOCKING 3 AMP
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) DIODE CR47, 48, 47, 48, 23, 24
5)
6)
7)
8) TCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25CR47, 48 (REF)
PART NUMBER: JANTXV1N5551

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF FCP VOLTAGE TO COOLANT PUMP AND H2 PUMP, RESULTING IN FCP FAILURE. POSSIBLE LOSS OF CREW/VEHICLE WITH ONE ADDITIONAL FCP FAILURE.

REFERENCES: ALSO DIODES 40V76A26CR47, CR48, 40V76A27CR23, CR24

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/3
MDAC ID: 2124 ABORT: 3/3

ITEM: DIODE, BLOCKING 3 AMP
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) DIODE CR47, 48, 47, 48, 23, 24
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25CR47, 48 (REF)
PART NUMBER: JANTXV1N5551

CAUSES: THERMAL STRESS, CONTAMINATION)

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO DIODES 40V76A26CR47, CR48, 40V76A27CR23, CR24

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2125

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR13, AR12, AR12
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR13, AR12, AR12
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25AR13 (REF)
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO HDC 40V76A26AR12, 40V76A27AR12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2126

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR13, AR12, AR12
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) HDC AR13, AR12, AR12
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25AR13 (REF)
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO HDC 40V76A26AR12, 40V76A27AR12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/3
MDAC ID: 2127 ABORT: 3/3

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR12
FAILURE MODE: ALL CREDIBLE MODES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA-1
4) HDC AR12
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25AR12
PART NUMBER: MC477-0261-0002

CAUSES: STRUCTURAL FAILURE, MECHANICAL & THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
THIS ITEM NEVER RECEIVES INPUT POWER. NO FURTHER ANALYSIS REQUIRED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2128

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR11, AR11
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN, SHORT TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA-2,3
4) HDC AR11, AR11
5)
6)
7)
8) TCS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26AR11, 7AR11
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF ABILITY TO INHIBIT START-UP HTR. FCP OVERHEATS. FCP DEGRADATION AND POSSIBLE FCP LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2129

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

ITEM: HYBRID DRIVER CONTROLLER, TYPE I, AR11, AR11
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA-2,3
4) HDC AR11, AR11
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A26AR11, 7AR11
PART NUMBER: MC477-0261-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2130

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

ITEM: RESISTOR 1.2 KOHM, 2W
FAILURE MODE: ELEMENT OPENS, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) RESISTOR A1R13, 13, 14
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25A1R13 (REF)
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO RESISTORS 40V76A26A1R13, 7A1R13

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2131

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

ITEM: RESISTOR 1.2 KOHM, 2W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) MID PCA 1,2,3
4) RESISTOR A1R13, 13, 14
5)
6)
7)
8) TCS
9) 05-6MA

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: 40V76A25A1R13 (REF)
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO RESISTORS 40V76A26A1R13, 7A1R13

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2132

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

ITEM: SWITCH, FUEL CELL H2O LINE HTR
FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S9
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S9
PART NUMBER: ME452-0102-7206

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: WHEN IN AUTO (A) POSITION, PRIMARY HEATER ELEMENTS IN FC 1,2 & 3 ARE ACTIVATED. WHEN IN AUTO (B) POSITION, SECONDARY HTR ELEMENTS ARE ACTIVATED.
EFFECTS: ENERGIZES HEATER ELEMENTS OF FC H2O LINE HTR FOR EACH FC. HTRS USED ONLY DURING STARTUP OF FCP. CAPABILITY TO START A SHUTDOWN FC DURING FLIGHT HAS NOT BEEN DEMONSTRATED, HOWEVER THE CAPABILITY DOES EXIST.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/3
MDAC ID: 2133 ABORT: 3/3

ITEM: SWITCH, FUEL CELL H2O LINE HTR
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S9
5)
6)
7)
8) WRS
9) 05-6MA

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: 32V73A12A1S9
PART NUMBER: ME452-0102-7206

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: WHEN IN AUTO (A) POSITION, PRIMARY HEATER ELEMENTS IN FC 1,2 & 3 ARE ACTIVATED. WHEN IN AUTO (B) POSITION, SECONDARY HTR ELEMENTS ARE ACTIVATED.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2134

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

ITEM: FUSE, 1 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) FUSE F1
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1F1
PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H2O LINE HTR SWITCH (S9) AND THE CORRESPONDING PRIMARY FC H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H2O LINE. ONLY NEEDED IN THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL OPERATIONS AS TEMPERATURE OF PRODUCT H2O PREVENTS FREEZING.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2135

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

ITEM: FUSE, 7.5 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) FUSE F52
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25F52
PART NUMBER: ME451-0018-07500

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS POWER FROM MN BUS A AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AND THE CORRESPONDING PRIMARY FCI H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF PRIMARY HTR ELEMENTS. NO EFFECT UNLESS A SHUTDOWN FCP HAS TO RESTARTED DURING FLIGHT. THIS CAPABILITY HAS NEVER BEEN DEMONSTRATED, HOWEVER THE PROCEDURE EXISTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2136

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

ITEM: FUSE , 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) FUSE F5
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25F5
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AND THE PRIMARY FC1 H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF PRIMARY HTR ELEMENTS. NO EFFECT UNLESS A SHUTDOWN FCP HAS TO RESTARTED DURING FLIGHT. THIS CAPABILITY HAS NEVER BEEN DEMONSTRATED, HOWEVER THE PROCEDURE EXISTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2137

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III, AR7
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR7
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR7
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC1 H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF PRIMARY HTR ELEMENTS. NO EFFECT UNLESS A SHUTDOWN FCP HAS TO RESTARTED DURING FLIGHT. THIS CAPABILITY HAS NEVER BEEN DEMONSTRATED, HOWEVER THE PROCEDURE EXISTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2138

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III, AR7
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR7
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25AR7
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF PWR TO PRIMARY FC1 H2O LINE HTR (AUTO A PATH).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2139

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) FUSE F11
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25F11
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AND THE SECONDARY FC1 H2O LINE HTR (AUTO B PATH).
EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. ONLY USED IN THE EVENT THAT A FCP MUST BE STARTED PREFLIGHT OR RESTARTED DURING THE MISSION. THIS CAPABILITY HAS NOT BEEN DEMONSTRATED, BUT DOES EXIST.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2140

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

ITEM: HYBRID DRIVER CONTROLLER TYPER III AR14
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR14
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25AR14
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC1 H2O LINE HTR (AUTO B PATH).
EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. ONLY USED IN THE EVENT THAT A FCP MUST BE STARTED PREFLIGHT OR RESTARTED DURING THE MISSION. THIS CAPABILITY HAS NOT BEEN DEMONSTRATED, BUT DOES EXIST.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2141

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

ITEM: HYBRID DRIVER CONTROLLER TYPER III AR14
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR14
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25AR14
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC1 H20 LINE HTR (AUTO B PATH).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2142

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

ITEM: FUSE, 1 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) FUSE F2
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1F2
PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H2O LINE HTR SWITCH (S9) AND THE CORRESPONDING PRIMARY FC H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H2O LINE. ONLY NEEDED IN THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL OPERATIONS AS TEMPERATURE OF H2O PREVENTS FREEZING.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2143

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) FUSE F14
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26F14
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AND PRIMARY FC2 H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H2O LINE. ONLY NEEDED IN THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL OPERATIONS AS TEMPERATURE OF H2O PREVENTS FREEZING.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2144

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR14
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR14
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26AR14
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC2 H20 LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF ABILITY TO HEAT PRODUCT H20 LINE. ONLY NEEDED IN THE EVENT A FCP MUST BE RESTARTED. HEATERS NOT USED DURING NORMAL OPERATIONS AS TEMPERATURE OF H20 PREVENTS FREEZING.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2145

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR14
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR14
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A26AR14
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC2 H2O LINE HTR (AUTO A PATH).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2146

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) FUSE F13
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A26F13
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR HDC AND SECONDARY FC2 H2O LINE HTR (AUTO B PATH).
EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. HTRS ONLY USED WHEN STARTING A FCP DURING PREFLIGHT OR WHEN RESTARTING A FCP DURING THE MISSION. THIS CAPABILITY EXISTS, BUT HAS NOT BEEN DEMONSTRATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2147

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR13
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR13
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 40V76A26AR13
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC2 H2O LINE HTR (AUTO B PATH).
EFFECTS: LOSS OF POWER TO SECONDARY HTR ELEMENTS. HTRS ONLY USED WHEN STARTING A FCP DURING PREFLIGHT OR WHEN RESTARTING A FCP DURING THE MISSION. THIS CAPABILITY EXISTS, BUT HAS NOT BEEN DEMONSTRATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2148

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR13
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR13
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A26AR13
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC2 H2O LINE HTR (AUTO B PATH).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2149

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) FUSE F8
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V75A27F8
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCT POWER AND PROVIDE CIRCUIT PROTECTION TO THE HDC AND PRIMARY FC3 H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF PRIMARY HEATER ELEMENTS. HTRS USED ONLY DURING FCP STARTUP PREFLIGHT AND DURING FCP RESTART DURING A MISSION. THE ON-ORBIT CAPABILITY TO RESTART A FCP HAS NOT BEEN DEMONSTRATED; HOWEVER, PROCEDURES EXIST TO RESTART A SHUTDOWN FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2150

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR24
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR24
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V75A27AR24
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC3 H2O LINE HTR (AUTO A PATH).
EFFECTS: LOSS OF PRIMARY HEATER ELEMENTS. HTRS USED ONLY DURING FCP STARTUP PREFLIGHT AND DURING FCP RESTART DURING A MISSION. THE ON-ORBIT CAPABILITY TO RESTART A FCP HAS NOT BEEN DEMONSTRATED; HOWEVER, PROCEDURES EXIST TO RESTART A SHUTDOWN FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2151

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR24
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR24
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V75A27AR24
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO PRIMARY FC3 H2O LINE HTR (AUTO A PATH).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2152

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

ITEM: FUSE, 7.5 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) FUSE F13
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V75A27F13
PART NUMBER: ME451-0018-07500

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCT MAIN BUS POWER AND PROVIDE CIRCUIT PROTECTION TO THE HDC AND SECONDARY FC3 H2O LINE HTR (AUTO B PATH).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2153

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) FUSE F5
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V75A27F5
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCT POWER AND PROVIDE CIRCUIT PROTECTION TO THE HDC AND SECONDARY FC3 H2O LINE HTR (AUTO B PATH).
EFFECTS: LOSS OF POWER TO SECONDARY HEATER ELEMENTS. HTRS USED ONLY DURING PREFLIGHT STARTUP OF FCP AND FOR THE RESTART OF A SHUTDOWN FCP DURING A MISSION. THE CAPABILITY TO RESTART A SHUTDOWN FCP HAS NOT BEEN DEMONSTRATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2154

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR5
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V75A27AR5
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC3 H2O LINE HTR (AUTO B PATH).
EFFECTS: LOSS OF POWER TO SECONDARY HEATER ELEMENTS. HTRS USED ONLY DURING PREFLIGHT STARTUP OF FCP AND FOR THE RESTART OF A SHUTDOWN FCP DURING A MISSION. THE CAPABILITY TO RESTART A SHUTDOWN FCP HAS NOT BEEN DEMONSTRATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2155

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR5
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V75A27AR5
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES REMOTE CONTROL OF POWER TO SECONDARY FC3 H2O LINE HTR (AUTO B PATH).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2156

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

ITEM: FUSE, 1 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) FUSE F3
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1F3
PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H2O RELIEF HTR SWITCH S10 (AUTO A PATH).
EFFECTS: LOSS OF PRIMARY HEATER ELEMENTS OF THE THREE H2O RELIEF VALVE HTRS, VENT LINE, BARREL AND WATER NOZZLE HEATERS.
REDUNDANCY IN STANDBY HEATERS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2157

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

ITEM: FUSE, 1 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) FUSE F4
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 32V73A12A1F4
PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS POWER AND PROVIDES CIRCUIT PROTECTION FOR FC H2O RELIEF HTR SWITCH S10 (AUTO B PATH).
EFFECTS: LOSS OF STANDBY HEATER ELEMENTS OF THE THREE H2O RELIEF VALVE HTRS, VENT LINE, BARREL AND WATER NOZZLE HTRS. LOSS OF FC AND CREW/VEHICLE DUE TO FLOODING OF FC BY EXCESS H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2158

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

ITEM: SWITCH, FUEL CELL H2O RELIEF HEATER
FAILURE MODE: FAILS TO TRANSFER, FAILS TO CLOSE, FAILS TO CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S10
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1S10
PART NUMBER: ME452-0102-7206

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: IN AUTO (A) POSITION, ENERGIZES THE PRIMARY HTR ELEMENT OF H2O RELIEF VALVES, H2O VENT LINE, AND H2O BARREL HTR ASSY. IN AUTO (B) POSITION, ENERGIZES THE SECONDARY HTR ELEMENTS.
EFFECTS: SECONDARY HEATER ELEMENTS AVAILABLE OR EXCESS H2O CAN BE ROUTED TO H2O SUPPLY STORAGE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2159

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

ITEM: SWITCH, FUEL CELL H2O RELIEF HEATER
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) SWITCH S10
5)
6)
7)
8) WRS
9) 05-6MA

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: 32V73A12A1S10
PART NUMBER: ME452-0102-7206

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: IN AUTO (A) POSITION, ENERGIZES THE PRIMARY HTR ELEMENT OF H2O RELIEF VALVES, H2O VENT LINE, AND H2O BARREL HTR ASSY. IN AUTO (B) POSITION, ENERGIZES THE SECONDARY HTR ELEMENTS.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2160

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

ITEM: DIODE, 1 AMP BLOCKING
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) DIODE A9CR2, A10CR1, A10CR2
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A12A1A9CR2, 32V73A12A1A10CR1, 32V73A12A1A10CR2
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CONTROL TO HTR CIRCUITRY BY CONTROLLING COMMANDS FROM FC H2O RELIEF HTR SWITCH S10 TO RESPECTIVE HTR ELEMENTS. FUNCTION IS DEPENDENT ON S10 POSITION AUTO (A) OR AUTO (B).
EFFECTS: LOSS OF FUNCTION RESULTS IN HTR ELEMENT MALFUNCTION IN EITHER AUTO (A) OR AUTO (B) POSITION. SWITCHING TO ALTERNATE POSITION CORRECTS FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2161

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

ITEM: DIODE, 1 AMP BLOCKING
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) DIODE A9CR2, A10CR1, A10CR2
5)
6)
7)
8) WRS
9) 05-6MA

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: 32V73A12A1A9CR2, 32V73A12A1A10CR1, 32V73A12A1A10CR2
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CONTROL TO HTR CIRCUITRY BY CONTROLLING COMMANDS FROM FC H2O RELIEF HTR SWITCH S10 TO RESPECTIVE HTR ELEMENTS. FUNCTION IS DEPENDENT ON S10 POSITION AUTO (A) OR AUTO (B).
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2162

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

ITEM: RESISTORS, 5.1 K OHM, 1/4 W
FAILURE MODE: OPEN, SHORT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTORS A9R1, A9R2, A10R1, A10R2
5)
6)
7)
8) WRS
9) 05-6MA

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: 32V73A12A1A9R1, 32V73A12A1A9R2, 32V73A12A1A10R1, 32V73A12A1A10R2
PART NUMBER: RLR07C512GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: PROVIDE CURRENT ISOLATION BETWEEN FC H2O LINE HTR SWITCH (S9) AND MDM OF4, AND BETWEEN FC H2O RELIEF HTR SWITCH (S10) AND MDM OF4.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2163

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

ITEM: RESISTORS, 5.1 K OHM, 1/4 W
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PNL R12A1
4) RESISTORS A9R1, A9R2, A10R1, A10R2
5)
6)
7)
8) WRS
9) 05-6MA

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: 32V73A12A1A9R1, 32V73A12A1A9R2, 32V73A12A1A10R1, 32V73A12A1A10R2
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDE CURRENT ISOLATION BETWEEN FC H2O LINE HTR SWITCH (S9) AND MDM OF4, AND BETWEEN FC H2O RELIEF HTR SWITCH (S10) ANDD MDM OF4.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2164 ABORT: 3/1R

ITEM: DIODE, 1 AMP ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) DIODES A1CR50, A1CR51, A1CR52, A1CR53
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A26A1CR50, 40V76A26A1CR51, 40V76A26A1CR52, 40V76A26A1CR53
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CIRCUIT ISOLATION BETWEEN COMMANDS CONTROLLING HDC'S AR5 AND AR36 WHICH PROVIDE POWER TO STDBY NOZZLE HTR.
EFFECTS: LOSS OF STDBY NOZZLE HTR. NO EFFECT UNLESS FAILURE OF H2O STORAGE AND H2O NOZZLE FREEZES. THEN LOSS OF FC BY FLOODING WITH EXCESS H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2165

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

ITEM: DIODE, 1 AMP ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) DIODES A1CR50, A1CR51, A1CR52, A1CR53
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A26A1CR50, 40V76A26A1CR51, 40V76A26A1CR52, 40V76A26A1CR5
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CIRCUIT ISOLATION BETWEEN COMMANDS CONTROLLING HDC'S AR5 AN AR36 WHICH PROVIDE POWER TO STDBY NOZZLE HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2166

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

ITEM: DIODE, 1 AMP ISOLATION
FAILURE MODE: OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1 & 2
4) DIODES A1CR52, A1CR53, A1CR55
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25A1CR52, 40V76A25A1CR53, 40V76A26A1CR55
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS MDM INPUT AND PROVIDES CIRCUIT ISOLATION BETWEEN MDM OF2 AND NOZZLE HTR TEMP CONTROLLERS.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2167

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

ITEM: DIODE, 1 AMP ISOLATION
FAILURE MODE: SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1 & 2
4) DIODES A1CR52, A1CR53, A1CR55
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25A1CR52, 40V76A25A1CR53, 40V76A26A1CR55
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS MDM INPUT AND PROVIDES CIRCUIT ISOLATION BETWEEN MDM OF2 AND NOZZLE HTR TEMP CONTROLLERS.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2168

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

ITEM: RESISTOR, 5.1K
FAILURE MODE: ELEMENT OPEN, HI-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1 & 2
4) RESISTOR A1R29, A1R30, A1R29
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25A1R29, 40V76A25A1R30, 40V76A26A1R29
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION AND LIMITING BETWEEN H2O NOZZLE HTR TEMPERATURE CONTROLLERS AND MDM'S.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2169

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

ITEM: RESISTOR, 5.1K
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1 & 2
4) RESISTORS A1R29, A1R30, A1R29
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25A1R29 40V76A25A1R30 40V76A26A1R29
PART NUMBER: RLR07C512GR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
FUNCTION: PROVIDES CURRENT ISOLATION AND LIMITING BETWEEN H2O NOZZLE HTR TEMPERATURE. CONTROLLERS AND MDM'S.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2170

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) FUSE F3
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25F3
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR5 AND PRIMARY HTR ELEMENT OF H2O RELIEF VLV #1 HTR.
EFFECTS: LOSS OF PRIMARY H2O RELIEF VALVE #1 HTR. REDUNDANCY IN STANDBY HTR'S.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2171

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR5
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR5
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR. REDUNDANCY IN SECONDARY HTR ELEMENTS SO MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF VEHICLE/CREW.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2172

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR5
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25AR5
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2173

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) FUSE F44
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25F44
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR44 AND SECONDARY HTR ELEMENT OF H2O RELIEF VALVE #1 HTR.
EFFECTS: LOSS OF SECONDARY H2O RELIEF VALVE #1 HTR. POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2174

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR44
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTANTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR44
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25AR44
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR. POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2175

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR44
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR44
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25AR44
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2176

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) FUSE F10
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26F10
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR39 AND PRIMARY HTR ELEMENTS OF H2O RELIEF VALVE #2 HTR.
EFFECTS: LOSS OF PRIMARY H2O RELIEF VALVE #2 HTR. REDUNDANCY IN SECONDARY HTR'S.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2177

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR39
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR39
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26AR39
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR VALVE IN FC NO 2. REDUNDANCY IN SECONDARY HTR AND MULTIPLE FC'S SO MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF VEHICLE/CREW.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2178

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR39
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR39
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A26AR39
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2179

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) FUSE F8
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A26F8
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR40 AND SEECONDARY HTR ELEMENT OF H2O RELIEF VALVE #2 HTR.
EFFECTS: LOSS OF SECONDARY H2O RELIEF VALVE #2 HTR. POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2180

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR40
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR40
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A26AR40
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR VALVE IN FC NO 2. POSSIBLE LOSS OF FC DUE TO FLOODING BY EXCESS H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2181

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR40
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR40
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A26AR40
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2182

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) FUSE F10
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A27F10
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR25 AND PRIMARY HTR ELEMENT OF H2O RELIEF VALVE #3 HTR.
EFFECTS: LOSS OF PRIMARY H2O RELIEF VALVE #3 HTR. REDUNDANCY IN SECONDARY HTR'S.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2183

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR25
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR25
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A27AR25
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR FOR FC NO 3. REDUNDANCY IN SECONDARY HTR ELEMENTS SO MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/3
MDAC ID: 2184 ABORT: 3/3

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR25
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR25
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A27AR25
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2185

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) FUSE F4
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A27F4
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR6 AND SECONDARY HTR ELEMENT OF H2O RELIEF VALVE #3 HTR.
EFFECTS: LOSS OF SECONDARY H2O RELIEF VALVE #3 HTR. POSSIBLE LOSS OF FC BY FLOODING OF FC BY EXCESS PRODUCT H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2186

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR6
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR6
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A27AR6
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR FOR FC NO 3. POSSIBLE LOSS OF FC BY FLOODING WITH EXCESS PRODUCT H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2187

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR6
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-3
4) HDC AR6
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A27AR6
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2188

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1, PCA-2
4) FUSE F4, F4
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25F4, 40V76A26F4
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR THE HDC AR6 AND PRIMARY AND SECONDARY H2O RELIEF HTR.
EFFECTS: LOSS OF RELIEF VALVE HTR CAPABILITY IN EITHER THE PRIMARY OR SECONDARY MODE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2189

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

ITEM: HYBRID DEVICE CONTROLLER TYPE III AR6
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR6
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25AR6
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF PRIMARY H2O RELIEF VLV HTR ELEMENT. REDUNDANCY IN SECONDARY HTRS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL POWER NEEDED TO HEAT VENT VLV.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2190

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

ITEM: HYBRID DEVICE CONTROLLER TYPE III AR6
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1
4) HDC AR6
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25AR6
PART NUMBER: MC477-0263-0002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 2/1R
MDAC ID: 2191 ABORT: 2/1R

ITEM: HYBRID DEVICE CONTROLLER TYPE III AR6
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTANTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR6
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A26AR6
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO SECONDARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: LOSS OF SECONDARY H2O RELIEF VLV HTR ELEMENTS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF ALL POWER NEEDED TO HEAT VENT VLV, AND LOSS OF FC BY EXCESS PRODUCT H2O FLOODING.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2192

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

ITEM: HYBRID DEVICE CONTROLLER TYPE III AR6
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR6
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A26AR6
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY HTR ELEMENTS OF THE H2O RELIEF HTR.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2193

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

ITEM: FUSE, 1 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1, PCA-2
4) FUSE F42, F12
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V76A25F42, 40V76A26F12
PART NUMBER: ME451-0018-0100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR HDC'S 37 AND PRIMARY AND SECONDARY HTR ELEMENTS OF FC 1,2,3 BARREL HEATER.
EFFECTS: LOSS OF EITHER PRIMARY OR SECONDARY BARREL HEATER ELEMENTS. REDUNDANCY EXISTS IN ALTERNATE HEATER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2194

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR37
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1, PCA-2
4) HDC AR37
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A25AR37, 40V76A26AR37
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY & SECONDARY HTR ELEMENTS OF THE WATER BARREL HEATER.
EFFECTS: LOSS OF EITHER PRIMARY OR SECONDARY HTR ELEMENTS OF THE H2O BARREL HEATER. REDUNDANCY IN SECONDARY HTR ELEMENTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2195

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR37
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-1, PCA-2
4) HDC AR37
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V76A25AR37, 40V76A26AR37
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER TO PRIMARY & SECONDARY HTR ELEMENTS OF THE WATER BARREL HEATER.
EFFECTS: NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2196

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

ITEM: FUSE, 3 AMP
FAILURE MODE: OPEN - INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) FUSE F3
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26F3
PART NUMBER: ME451-0018-0300

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, VIBRATION, CONTAMINATION, DEGRADED MATERIAL

EFFECTS/RATIONALE:
FUNCTION: CONDUCTS INPUT POWER AND PROVIDES CIRCUIT PROTECTION FOR HDC'S AR5 AND AR36 AND PRIMARY HTR ELEMENTS OF NOZZLE HEATER.
EFFECTS: LOSS PRIMARY HTR ELEMENTS OF NOZZLE HEATER. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO DUMP EXCESS PRODUCT H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2197

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5, AR36
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENTLY OPEN, SHORTS TO GROUND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR5, AR36
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V76A26AR5, 40V76A26AR36
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER FOR HTR ELEMENT OF FC H2O NOZZLE HTR.
EFFECTS: LOSS OF ABILITYY TO DUMP H2O OVERBOARD WHEN NOZZLE FREEZES. FC MAY POSSIBLY FLOOD. POSSIBLE CREW/VEHICLE LOSS. NO REDUNDANT HTR ELEMENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2198

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

ITEM: HYBRID DRIVER CONTROLLER TYPE III AR5, AR36
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA-2
4) HDC AR5, AR36
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [F] C [F]

LOCATION: 40V76A26AR5 40V76A26AR36
PART NUMBER: MC477-0263-002

CAUSES: THERMAL STRESS, VIBRATION, CONTAMINATION, MECHANICAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
FUNCTION: PROVIDES FOR REMOTE CONTROL OF POWER FOR HTR ELEMENT OF FC H2O NOZZLE HTR.
EFFECTS: POSSIBLE OVERHEATING OF H2O VENT NOZZLE WHICH COULD DEGRADE THERMAL INSULATION

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2199

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

ITEM: THERMAL SWITCH
FAILURE MODE: FAILS OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) TIE BAR 10
4) THERMAL SWITCHES 172, 171, 272, 271, 372, 371
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

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

LOCATION: 40V4STS171, 172 (REF)
PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
CONTROLS PRODUCT WATER LINE HTR ELEMENTS. POSSIBLE LOSS OF MISSION WHEN ALL HEATING CAPABILITY IS LOST.

REFERENCES: ALSO THERMAL SWITCHES 272, 271, 372, 371

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2200

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

ITEM: THERMAL SWITCH
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) TIE BAR 10
4) THERMAL SWITCHES 172, 171, 272, 271, 372, 371
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V4STS171, 172 (REF)
PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO THERMAL SWITCHES 272, 271, 372, 371

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2201

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

ITEM: THERMAL SWITCH
FAILURE MODE: FAILS OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) TIE BAR 8, 9
4) THERMAL SWITCH 170, 270, 370, 072
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 40V4STS170, 270, 370, 072
PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
CONTROLS H2O RELIEF VALVES PRIMARY HEATER ELEMENTS AND PRIMARY HEATER ELEMENTS OF THE H2O RELIEF VENT LINE. POSSIBLE LOSS OF VEHICLE/CREW AFTER LOSS OF ALL HEATING NECESSARY TO FCP PRODUCT H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2202

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

ITEM: THERMAL SWITCH
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) TIE BAR 8, 9
4) THERMAL SWITCH 170, 270, 370, 072
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V4STS170, 270, 370, 072
PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2203

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

ITEM: THERMAL SWITCH
FAILURE MODE: FAILS OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) TIE BAR 8, 9
4) THERMAL SWITCH 170, 270, 370, 071
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 40V45MT170, 270, 370, 071
PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
CONTROLS H2O RELIEF VALVES STANDBY HEATER ELEMENTS AND STANDBY HEATER ELEMENTS OF THE H2O RELIEF VENT LINE. POSSIBLE LOSS OF VEHICLE/CREW AFTER LOSS OF ALL HEATING NECESSARY TO FCP PRODUCT H2O.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2204

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

ITEM: THERMAL SWITCH
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) TIE BAR 8, 9
4) THERMAL SWITCH 170, 270, 370, 071
5)
6)
7)
8) WRS
9) 05-6MA

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: 40V45MT170, 270, 370, 071
PART NUMBER: MC452-0147

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2205

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

ITEM: TEMPERATURE CONTROLLER AR49, AR49
FAILURE MODE: LOSS OF OUTPUT, FAIL TO CONDUCT, INADVERTENT OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA 1,2
4) TEMPERATURE CONTROLLER AR49, AR49
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [F] C [P]

LOCATION: 40V76A25AR49, 6AR49
PART NUMBER: MC450-0062-0002

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF FC PRODUCT H2O OVERBOARD DUMP NOZZLE HEATER LOGIC. FREEZING OF NOZZLE AND FREEZING OF FCP. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2206

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

ITEM: TEMPERATURE CONTROLLER AR49, AR49
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) PCA 1,2
4) TEMPERATURE CONTROLLER AR49, AR49
5)
6)
7)
8) WRS
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [F] C [P]

LOCATION: 40V76A25AR49, 6AR49
PART NUMBER: MC450-0062-0002

CAUSES: VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF FC PRODUCT H2O OVERBOARD DUMP NOZZLE HEATER LOGIC.
POSSIBLE LOSS OF FUNCTION AND EVENTUAL LOSS OF FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2207

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

ITEM: FCP 1,2,3 HTR PWR ON IND. 5.1K RESISTOR
FAILURE MODE: OPEN, ELEMENT OPENS, HIGH RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) FUEL CELL
3) TERM BD. 40TB13V, 135, 136
4) RESISTOR, MODULE ASSY 5.1K OHMS
5)
6)
7)
8)
9) 05-6MA

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: TB134, 135, 136
PART NUMBER: RLR07C5101GR

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF MEASUREMENT SIGNAL FOR FCP END CELL HTR STATUS. LOSS OF ABILITY TO DETECT "FAILED ON" HTR. FAILED "ON" HTR COULD CAUSE CATASTROPHIC FC FAILURE.

REFERENCES:

REPORT DATE 12/18/86

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2221

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

ITEM: SWITCH, FUEL CELL 1, 2, 3 REACTANTS
FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2
4) SWITCH, S1, S7, S4
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S1, S7, S4
PART NUMBER: ME452-0102-7205

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO OPERATE REACTANT SUPPLY VALVES. POSSIBLE LOSS OF ABILITY TO SHUTDOWN REACTANTS TO A FCP IF NECESSARY. POSSIBLE LOSS OF CREW/VEHICLE WITH FAILURE TO SHUTDOWN A FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2222

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

ITEM: SWITCH, FUEL CELL 1, 2, 3 REACTANTS
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2
4) SWITCH, S1, S7, S4
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S1, S7, S4
PART NUMBER: ME452-0102-7205

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
POSSIBLE LOSS OF FCP WITH THE INADVERTENT SHUTDOWN OF REACTANT VALVE SUPPLY. POSSIBLE LOSS OF CREW/VEHICLE WITH LOSS OF FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2223 ABORT: 3/1R

ITEM: SWITCH, H2 TANK 1-4 PRIMARY HEATER CONTROL
FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH, S11, 19, 24, 4
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S11, 19, 24, (REF)
PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF PRIMARY H2 TANK HEATER ELEMENTS. REDUNDANCY IN SECONDARY HTRS.

REFERENCES: ALSO A11A1S4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2224

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

ITEM: SWITCH, H2 TANK 1-4 PRIMARY HEATER CONTROL
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH, S11, 19, 24, 4
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S11, 19, 24, (REF)
PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO CONTROL HEATING OF H2 TANK. FAILURE OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

REFERENCES: ALSO A11A1S4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2225

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

ITEM: SWITCH, H2 TANK 1-4 STANDBY HEATER CONTROL
FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH, S12, 20, 25, 5
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 32V73A1A2S12, 20, 25, (REF)
PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF SECONDARY H2 TANK HEATER ELEMENTS. LOSS OF H2 TANK DUE TO INSUFFICIENT HEATING. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF FCP REACTANTS AND POSSIBLE LOSS OF FUEL CELL.

REFERENCES: ALSO A11A1S5

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2226

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

ITEM: SWITCH, H2 TANK 1-4 STANDBY HEATER CONTROL
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH, S12, 20, 25, 5
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 32V73A1A2S12, 20, 25, (REF)
PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO CONTROL HEATING OF H2 TANK. FAILURE OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

REFERENCES: ALSO A11A1S5

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2227

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

ITEM: SWITCH, O2 TANK 1-4 TEST/RESET CONTROL
FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH, S10, 15, 23, S3
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S10, 15, 23, (REF)
PART NUMBER: ME452-0102-7205

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO TEST AND RESET CIRCUITRY FOR THE O2 TANKS. POSSIBLE LOSS OF O2 TANK. POSSIBLE LOSS OF FUEL CELL DUE TO LOSS OF REACTANTS. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: ALSO 36V73A11A1S3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/25/86
SUBSYSTEM: EPD&C
MDAC ID: 2228

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

ITEM: SWITCH, O2 TANK 1-4 TEST/RESET CONTROL
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH, S10, 15, 23, S3
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S10, 15, 23, (REF)
PART NUMBER: ME452-0102-7205

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ABILITY TO TEST AND RESET CURRENT LEVEL DETECTORS. SHORT COULD CAUSE POSSIBLE EXPLOSION IN O2 TANK AND LOSS OF CREW/VEHICLE.

REFERENCES: ALSO 36V73A11A1S3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2229

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

ITEM: SWITCH, O2 TANK 1-4 PRIMARY HEATER CONTROL
FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH S8,13,21,S1
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S8, 13, 21 (REF)
PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF PRIMARY O2 TANK HEATER ELEMENTS. REDUNDANCY IN STANDBY HEATERS. MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE.

REFERENCES: ALSO 36V73A11A1S1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2230

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

ITEM: SWITCH, O2 TANK 1-4 PRIMARY HEATER CONTROL
FAILURE MODE: SHORTS, INADVERTENTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH S8,13,21,S1
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2S8, 13, 21 (REF)
PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO CONTROL HEATING OF O2 TANK. FAILURE OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

REFERENCES: ALSO 36V73A11A1S1

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2231

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

ITEM: SWITCH, O2 TANK 1-4 STANDBY HEATER CONTROL
FAILURE MODE: FAIL TO TRANSFER, FAIL TO CONDUCT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH S9, 14, 22, S2
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 32V73A1A2S9, 14, 22 (REF)
PART NUMBER: ME452-0102-7306

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF STANDBY O2 TANK HEATER ELEMENTS. LOSS OF O2 TANK DUE TO INSUFFICIENT HEATING. POSSIBLE LOSS OF CREW/VEHICLE AFTER LOSS OF ASSOCIATED FCP..

REFERENCES: ALSO 36V73A11A1S2

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2232

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

ITEM: SWITCH, O2 TANK 1-4 STANDBY HEATER CONTROL
FAILURE MODE: SHORTS, INADVERTANTLY CLOSES

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2, A11A1
4) SWITCH S9, 14, 22, S2
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: 32V73A1A2S9, 14, 22 (REF)
PART NUMBER: ME452-0102-7306

CAUSES: CONTAMINATION, SHOCK,VIBRATION'STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
INABILITY TO CONTROL HEATING OF O2 TANK. LOSS OF TANK DUE TO OVERPRESSURIZATION. LOSS OF CREW/VEHICLE DUE TO EVENTUAL EXPLOSION OF TANK.

REFERENCES: ALSO 36V73A11A1S2

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2233

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

ITEM: RESISTORS, 1.2 KOHM, 2 WATT
FAILURE MODE: OPEN, ELEMENT OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2
4) RESISTORS A2R1, R11, R12, A2R2, R10
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: 32V73A1A2A1R1,R5,R11,R12 (REF)
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ABILITY TO OPERATE THE O2 AND H2 FCP SUPPLY VALVES. POSSIBLE LOSS OF FCP DUE TO LACK OF REACTANTS. LOSS OF CREW/VEHICLE POSSIBLE.

REFERENCES: ALSO 32V73A1A2A2R2,R10

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2234

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

ITEM: RESISTORS, 1.2 KOHM, 2 WATT
FAILURE MODE: PARAMETER DEVIATION, OUT OF TOLERANCE, LO-RESIST

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2
4) RESISTORS A2R1, R11, R12, A2R2, R10
5)
6)
7)
8)
9) 05-6MB

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: 32V73A1A2A1R1,R5,R11,R12 (REF)
PART NUMBER: RWR80S1211FR

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
NONE.

REFERENCES: ALSO 32V73A1A2A2R2,R10

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2235 ABORT: 3/1R

ITEM: REMOTE POWER CONTROLLER 10A
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) RPC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: REF
PART NUMBER: MC450-0017-1100

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
PROVIDES POWER TO O2 TANK HEATERS. REDUNDANCY IN SECONDARY HTRS. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141RPC5 THRU 12, 2RPC5 THRU 12, 3RPC5 THRU 12, 4RPC5 THRU 12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2236

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

ITEM: REMOTE POWER CONTROLLER 10A
FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) RPC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: REF
PART NUMBER: MC450-0017-1100

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
PROVIDES POWER TO O2 TANK HEATERS. ONE SERIES RPC FAILURE WILL NOT CAUSE OVERHEATING. DUAL FAILURES WILL CAUSE OVERHEATING AND LOSS OF O2 BY CONTINUOUSLY POWERING HEATER ELEMENT.

REFERENCES: 40V76A141RPC5 THRU 12, 2RPC5 THRU 12, 3RPC5 THRU 12, 4RPC5 THRU 12

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2237

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

ITEM: REMOTE POWER CONTROLLER 5A
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) RPC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: REF
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
PROVIDES POWER TO H2 TANK HEATERS. LOSS OF H2 TANK DUE TO INSUFFICIENT HEATING OF TANK. REDUNDANCY IN SECONDARY HEATERS.

REFERENCES: 40V76A141RPC1 THRU 4, 2RPC1 THRU 4, 3RPC1 THRU 4, 4RPC1 THRU 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2238

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

ITEM: REMOTE POWER CONTROLLER 5A
FAILURE MODE: INADVERTENT OUTPUT, SHORTS, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) RPC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [F] C [P]

LOCATION: REF
PART NUMBER: MC450-0017-1050

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
PROVIDES POWER TO H2 TANK HEATERS. FAILURE OF TWO RPC'S IN SERIES WILL CAUSE CONTINUOUS HEATING OF H2 TANK AND LOSS OF H2 TANK. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141RPC1 THRU 4, 2RPC1 THRU 4, 3RPC1 THRU 4, 4RPC1 THRU 4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2239

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

ITEM: HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, OPEN CONTROL
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA 1,2&3
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0263-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER TO ASSOCIATED F/C SUPPLY VALVE. ADDITONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REACTANTS AND HAVE RESULTING FCP SHUTDOWN.

REFERENCES: 40V76A25AR23,24,25,26, 6AR23,24,25,26, 7AR15,16,17,18

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2240

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

ITEM: HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, OPEN CONTROL
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA 1,2&3
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [F] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0263-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
PROVIDES POWER TO FC SUPPLY VALVES. ONE SERIES HDC FAILURE WILL NOT CAUSE LOSS OF FUNCTION. DUAL FAILURES PREVENT THE OPENING OF VALVE. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A25AR23,24,25,26, 6AR23,24,25,26, 7AR15,16,17,18

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2241

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

ITEM: HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, CLOSE CONTROL
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA 1,2&3
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0263-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER TO ASSOCIATED F/C CLOSE SUPPLY VALVE. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ABILITY TO CLOSE VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO SHUTDOWN A FCP.

REFERENCES: 40V76A25AR25,27,28,29,30, 6AR27,28,29,30, 7AR19,20,21,22

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2242

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

ITEM: HYBRID DRIVER CONTROLLER, FUEL CELL 1,2,3, CLOSE CONTROL
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA 1,2&3
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0263-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
PROVIDES POWER TO FC CLOSE VALVES. ONE SERIES HDC FAILURE WILL NOT CAUSE LOSS OF FUNCTION. DUAL FAILURES PREVENT THE CLOSURE OF VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INABILITY TO SHUTDOWN FAILED FCP.

REFERENCES: 40V76A25AR25,27,28,29,30, 6AR27,28,29,30, 7AR19,20,21,22

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2243

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

ITEM: DIODE, ISOLATION
FAILURE MODE: OPEN, FAILS OPEN, FAILS TO CONDUCT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA 1,2&3
4) DIODES (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: JANTXV1N4246

CAUSES: CONTAMINATION, THERMAL STRESS, VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ABILITY TO OPEN OR CLOSE A FCP REACTANT VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO SUBSEQUENT LOSS OF FAILED FCP. POSSIBLE REACTANT CROSSOVER.

REFERENCES: 40V76A25A1CR31,33,35,37, 6A1CR31,33,35,37, 7A1CR15,17,19,21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2244

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

ITEM: DIODE, ISOLATION
FAILURE MODE: SHORTS, INTERNAL SHORT (DOES NOT BLOCK)

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA 1,2&3
4) DIODES (REF)
5)
6)
7)
8)
9) 05-6MB

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: (REF)
PART NUMBER: JANTXV1N4246

CAUSES: THERMAL STRESS, CONTAMINATION

EFFECTS/RATIONALE:
NONE.

REFERENCES: 40V76A25A1CR31,33,35,37, 6A1CR31,33,35,37, 7A1CR15,17,19,21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2247 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, O2 HTR A&B CONTROL
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
PROVIDES POWER TO RPC'S CONTROLLING O2 TANK HEATERS. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE THE LOSS OF TANK. REDUNDANCY IN STANDBY HTRS.

REFERENCES: 40V76A141AR12,14,19,21, 2AR12,14,19,21, 3AR12,14,19,21, 4AR12,14,19,21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2248

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

ITEM: HYBRID DRIVER CONTROLLER, O2 HTR A&B CONTROL
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
POSSIBLE CONTINUOUS HEATING OF O2 TANK HTR ELEMENT. DUAL FAILURES CAUSE HDC'S TO ENERGIZE HTR. POSSIBLE DAMAGE AND LOSS OF AFFECTED TANK. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141AR12,14,19,21, 2AR12,14,19,21, 3AR12,14,19,21, 4AR12,14,19,21

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2249 ABORT: 3/1R

ITEM: HYBRID DRIVER CONTROLLER, O2 HTR A&B INHIBIT
FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, INADVERTENTLY OPENS

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF CIRCUITRY TO INHIBIT O2 TANK HTR. REDUNDANT HTR CIRCUITS AVAILABLE. ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF CREW/VEHICLE. POSSIBLE CONTINUOUS HEATING OF O2 TANK.

REFERENCES: 40V76A141AR13,15,20,22, 2AR13,15,20,22, 3AR13,15,20,22, 4AR13,15,20,22

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2250

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

ITEM: HYBRID DRIVER CONTROLLER, O2 HTR A&B INHIBIT
FAILURE MODE: INADVERTENT OUTPUT, SHORTS INTERNALLY, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) HDC (REF)
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: (REF)
PART NUMBER: MC477-0261-0002

CAUSES: CONTAMINATION, STRUCTURAL FAILURE, SHOCK, VIBRATION

EFFECTS/RATIONALE:
HTR CONTROL CIRCUITRY INHIBITED BY LATCHING HDC. POSSIBLE LOSS OF ONE HTR ELEMENT OF O2 TANK. REDUNDANT HEATER AVAILABLE. CONTINUOUS HEATING OF TANK POSSIBLE WITH LOSS OF TANK AND POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES: 40V76A141AR13,15,20,22, 2AR13,15,20,22, 3AR13,15,20,22, 4AR13,15,20,22

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2251 ABORT: 3/1R

ITEM: CURRENT LEVEL DETECTOR, O2 TANK HTR
FAILURE MODE: LOSS OF OUTPUT, INADVERTENTLY OPENS, FAILS TO PROVIDE OUTPUT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) CURRENT LEVEL DETECTOR
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: O2 TANKS 1 THRU 4
PART NUMBER: MC431-0137-0001

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
DUAL FAILURES WOULD HAVE TO OCCUR BEFORE CONTINUOUSLY ENERGIZING HTR. MANUAL SHUTDOWN OF CONTROLLING RPC'S WOULD REMOVE POWER TO AFFECTED HTR.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2252

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

ITEM: CURRENT LEVEL DETECTOR, O2 TANK HTR
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) H2/O2 CONTROL BOX 1,2,3,4
4) CURRENT LEVEL DETECTOR
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: O2 TANKS 1 THRU 4
PART NUMBER: MC431-0137-0001

CAUSES: STRUCTURAL FAILURE, MECHANICAL SHOCK, THERMAL STRESS, VIBRATION

EFFECTS/RATIONALE:
LOSS OF O2 TANK HTR SHORT PROTECTION. LOSS OF ABILITY TO INHIBIT ASSOCIATED O2 TANK HEATER CIRCUITRY. POSSIBLE LOSS OF TANK DUE TO OVERPRESSURIZATION. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2253

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

ITEM: O2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORTS TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 1
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO ISOLATE SUBASSY #1. POSSIBLE DEGRADATION OF FC 2 AND 3. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2254

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

ITEM: O2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 1
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
MULTIPLE FAILURES WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REDUNDANCY. DEGRADATION OF FCP 1 AND FCP 3. REDUNDANCY IN CROSSOVER VALVE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2255

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

ITEM: H2 GSE SUPPLY VALVE CONTROL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, INADVERTENT OPEN, SHORTS TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

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: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, VIBRATIONS

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2256

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

ITEM: H2 GSE SUPPLY VALVE CONTROL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

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: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2257

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

ITEM: O2 GSE SUPPLY VALVE CONTROL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, INADVERTENT OPEN

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA NO. 1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

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: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2258

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

ITEM: O2 GSE SUPPLY VALVE CONTROL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) MID PCA NO. 1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

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: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
NONE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2259

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

ITEM: O2 PRIMARY ECLSS VALVE #1 SUPPLY SYS.
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL L2A1/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO OPEN OR CLOSE O2 SYSTEM #1 (PRIMARY) O2 SUPPLY VALVE TO PROVIDE O2 TO ECLSS. REDUNDANCY IN SECONDARY ECLSS O2 VALVE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF O2 AND ASSOCIATED FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2260

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

ITEM: O2 PRIMARY ECLSS VALVE #1 SUPPLY SYS.
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL L2A1/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
DUAL FAILURE WOULD HAVE TO OCCUR BEFORE PREMATURE OPERATION. VALVE IS NORMALLY OPEN DURING FLIGHT. CREW CONTROL WILL RESET FAILURE. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LACK OF SUFFICIENT O2 TO ECLSS. REDUNDANT PATHS TO SUPPLY ECLSS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2261 ABORT: 3/1R

ITEM: H2 MANIFOLD 2 ISOLATION VLV CNTL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORTS TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 2
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO ISOLATE SUBASSY #1. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE DEGRADATION OF FC 2 AND 3. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2262

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

ITEM: H2 MANIFOLD 2 ISOLATION VLV CNTL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 2
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REDUNDANCY. DEGRADATION OF FCP 2 AND FCP 3. CREW ACTION REQUIRED TO RESET LATCHING SOLENOID.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2263

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

ITEM: H2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 2
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
VALVE NORMALLY OPEN DURING FLIGHT. LOSS OF ABILITY TO ISOLATE SUB ASSY #2. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2264

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

ITEM: H2 MANIFOLD 1 ISOLATION VLV CNTL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 2
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REDUNDANCY. DEGRADATION OF FCP 1 AND FCP 3. VALVE NORMALLY OPEN DURING FLIGHT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2265

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

ITEM: O2 MANIFOLD 2 ISOL VLV CONTROL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 1
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO ISOLATE SUBASSY #1. POSSIBLE DEGRADATION OF FC 2 AND 3. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF FCP AND LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2266

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

ITEM: O2 MANIFOLD 2 ISOL VLV CONTROL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 1
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
ADDITIONAL FAILURE WOULD HAVE TO OCCUR BEFORE LOSS OF ALL REDUNDANCY. DEGRADATION OF FCP 2 AND FCP 3. CREW CAN RESET LATCHING SOLENOID.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2267

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

ITEM: FCP 1 REACTANT VLV CNTL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 4
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO MONITOR VALVE POSITION THROUGH PWR, CNTL AND TKBK CIRCUIT. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2268

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

ITEM: FCP 1 REACTANT VLV CNTL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA1
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 4
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
ADDITINAL FAILURE MUST OCCUR BEFORE INITIATION OF FUNCTION. CREW ACTION NECESSARY TO RECONFIGURE TKBK CIRCUIT. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2269

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

ITEM: FCP 2 REACTANT VLV CNTL CKT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 4
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO MONITOR VALVE POSITION THROUGH PWR, CNTRL AND TKBK CIRCUIT. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2270

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

ITEM: FCP 2 REACTANT VLV CNTL CKT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 4
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
ADDITIONAL FAILURE MUST OCCUR BEFORE INITIATION OF FUNCTION. CREW ACTION NECESSARY TO RECONFIGURE TKBK CIRCUIT. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2271

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

ITEM: FCP 3 REACTANT VLV CNTL CIRCUIT
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA3
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 4
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO MONITOR VALVE POSITION THROUGH PWR, CNTL AND TKBK CIRCUIT. VALVE IS NORMALLY OPEN DURING FLIGHT. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2272

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

ITEM: FCP 3 REACTANT VLV CNTL CIRCUIT
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/MID PCA3
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEET 4
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
ADDITIONAL FAILURE MUST OCCUR BEFORE INITIATION OF FUNCTION. CREW ACTION NECESSARY TO RECONFIGURE TKBK CIRCUIT. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2273

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

ITEM: O2 SECONDARY ECLSS VLV NO. 2 SUPPLY SYS
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER, SHORT TO GND

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL L2A1/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO OPEN OR CLOSE O2 SYSTEM #2 (SECONDARY) O2 SUPPLY VALVE TO PROVIDE O2 TO ECLSS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO LOSS OF O2 AND ASSOCIATED FCP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2274

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

ITEM: O2 SECONDARY ECLSS VLV NO. 2 SUPPLY SYS
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAIL TO CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL L2A1/MID PCA2
4) CIRCUIT, VALVE CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: SHEET 3
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
DUAL FAILURE WOULD HAVE TO OCCUR BEFORE PREMATURE OPERATION. CREW CONTROL CAN RESET FAILURE. POSSIBLE LOSS OF CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2275 ABORT: 3/3

ITEM: H2 HEATER A&B CONTROL CIRCUITS
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL 02/13/R1A2/H2/O2 BOX
4) CIRCUIT, HEATER CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEETS 5 THRU 8
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO CONTROL HTRS IN H2 TANKS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INSUFFICIENT HEATING OF H2 TANK AND EVENTUAL LOSS OF REACTANTS. REDUNDANCY IN SECONDARY HEATERS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2276

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

ITEM: H2 HEATER A&B CONTROL CIRCUITS
FAILURE MODE: INADVERTENT OPEN, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL 02/13/R1A2/H2/O2 BOX
4) CIRCUIT, HEATER CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: SHEETS 5 THRU 8
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
TANK NORMALLY OPERATED IN "AUTO" MODE. MANUAL CONTROL BY CREW WHEN "AUTO" FAILS. HEATERS ARE PREVENTED FROM OVERHEATING AND TANKS HAVE MECHANICAL RELIEF VALVE FOR OVERPRESSURIZATION PROTECTION. POSSIBLE LOSS OF H2 TANK BY EXPLOSION AND CREW/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C FLIGHT: 3/1R
MDAC ID: 2277 ABORT: 3/3

ITEM: O2 HEATER A&B CONTROL CIRCUITS
FAILURE MODE: OPEN CIRCUIT, LOSS OF POWER

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/H2/O2 CONT BOX
4) CIRCUIT, HEATER CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [P] C [P]

LOCATION: SHEETS 9,11,13,15
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
LOSS OF ABILITY TO CONTROL HTRS IN O2 TANKS. POSSIBLE LOSS OF CREW/VEHICLE DUE TO INSUFFICIENT HEATING OF O2 TANK AND EVENTUAL LOSS OF REACTANTS. REDUNDANCY IN SECONDARY HTRS.

REFERENCES:

C-4

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 11/28/86
SUBSYSTEM: EPD&C
MDAC ID: 2278

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

ITEM: O2 HEATER A&B CONTROL CIRCUITS
FAILURE MODE: INADVERTENT OUTPUT, CONDUCTS PREMATURELY, INTERNAL SHORT, FAILS CLOSE

LEAD ANALYST: J. PATTON SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) EPG
2) PRSDS
3) PNL R1A2/H2/O2 CONT BOX
4) CIRCUIT, HEATER CONTROL
5)
6)
7)
8)
9) 05-6MB

CRITICALITIES

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

REDUNDANCY SCREENS: A [1] B [NA] C [P]

LOCATION: SHEETS 9,11,13,15
PART NUMBER: VS70-450212

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, THERMAL STRESS

EFFECTS/RATIONALE:
NORMAL OPERATING MODE IS "AUTO". CREW MAY SELECT MANUAL CONTROL OF HEATERS AFTER FIRST FAILURE. HEATERS ARE INHIBITED FROM OVERHEATING AND PROTECTED BY OVERPRESSURIZATION BY RELIEF VALVE. POSSIBLE LOSS OF O2 TANK, FCP AND CREW/VEHICLE.

REFERENCES:

APPENDIX D
POTENTIAL CRITICAL ITEMS

MDAC ID	ITEM	FAILURE MODE
2003	FCP START/STOP RESISTOR	ELEMENT OPENS, HI-RESIST
2009	FC CONTROLLER SWITCH	FAIL TO TRANSFER
2011	FC RESISTOR	ELEMENT OPENS, HI-RESIST
2055	FC GPC PURGE SWITCH ISOLATION RESISTOR	ELEMENT OPENS, HI-RESIST
2059	FC PURGE HTR SWITCH ISOLATION RESISTOR	ELEMENT OPENS HI-RESIST
2075	GPC PURGE STATUS DIODE	OPEN
2081	GPC PURGE STATUS DIODE	OPEN
2084	FC 1 PUMP MOTOR CIRCUIT BREAKER	OPEN
2095	FC 2 PUMP MOTOR CIRCUIT BREAKER	OPEN
2104	FC 3 PUMP MOTOR CIRCUIT BREAKER	OPEN
2113	GPC AUTO PURGE FUSE	OPENS, INADVERTENTLY OPENS
2114	GPC AUTO PURGE FUSE	OPENS, INADVERTENTLY OPENS
2116	FPC PURGE VALVE ISOLATION DIODES	OPEN
2118	FC CONTROL PWR CKT FUSE	OPEN, INADVERTENTLY OPENS
2121	FC COOLANT PUMP/H2 PUMP HDC	LOSS OF OUTPUT
2123	FC COOLANT PUMP/H2 PUMP DIODE	OPEN
2139	FC1 H2O LINE HTR FUSE	OPEN, INADVERTENTLY OPENS
2140	FC1 H2O LINE HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2146	FC2 H2O LINE HTR FUSE	OPEN, INADVERTENTLY OPENS
2147	FC2 H2O LINE HTR HDC	LOSS OF OUTOUT, FAIL TO CONDUCT
2153	FC3 H2O LINE HTR FUSE	OPEN, INADVERTENTLY OPENS
2154	FC3 H2O LINE HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2157	FC H2O RELIEF HTR FUSE	OPEN, INADVERTENTLY OPENS
2158	FC H20 RELIEF HTR SWITCH	FAILS TO TRANSFER
2173	H2O RELIEF VLV 1 HTR FUSE	OPEN, INADVERTENTLY OPENS
2174	H20 RELIEF VLV 1 HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT

MDAC ID	ITEM	FAILURE MODE
2179	H2O RELIEF VLV 2 HTR FUSE	OPEN, INADVERTENTLY OPENS
2180	H2O RELIEF VLV 2 HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2185	H2O RELIEF VLV 3 HTR FUSE	OPEN, INADVERTENTLY OPENS
2186	H2O RELIEF VLV 3 HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2191	H2O RELIEF VLV HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2197	FC H20 NOZZLE HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2198	FC H2O NOZZLE HTR HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2199	THERMAL SWITCH	FAILS ON
2205	FC PRODUCT H2O DUMP NOZZLE LOGIC TEMP CNTLR	LOSS OF OUTPUT
2206	FC PRODUCT H2O DUMP NOZZLE LOGIC TEMP CNTLR	INADVERTENT OUTPUT
2221	FC 1,2,3 REACTANT SWITCH	FAILS TO TRANSFER
2222	FC 1,2,3 REACTANT SWITCH	SHORTS, INADVERTENTLY CLOSES
2224	H2 PRIM HTR CNTL SWITCH	SHORTS, INADVERTENTLY CLOSES
2225	H2 STDBY HTR CNTL SWITCH	FAILS TO TRANSFER
2226	H2 STDBY HTR CNTL SWITCH	SHORTS, INADVERTENTLY CLOSES
2228	O2 TK TEST/RESET CNTL SWITCH	SHORTS, INADVERTENTLY CLOSES
2230	O2 PRIM HTR CNTL SWITCH	SHORTS, INADVERTENTLY CLOSES
2231	O2 STDBY HTR CNTL SWITCH	FAILS TO TRANSFER
2232	O2 STDBY HTR CNTL SWITCH	SHORTS, INADVERTENTLY CLOSES
2233	REACT SPPLY VLV RESISTOR	OPEN, ELEMENT OPENS
2239	FC 1,2,3 OPEN HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2240	REACT SPPLY VLV HDC	INADVERTENT OUTPUT
2241	FC 1,2,3 CLOSE HDC	LOSS OF OUTPUT, FAIL TO CONDUCT
2242	FC 1,2,3 CLOSE HDC	INADVERTENT OUTPUT
2243	FC REACT VLV CLOSE DIODE	OPEN, FAILS OPEN
2248	O2 HTR A & B CNTL HDC	INADVERTENT OUTPUT
2253	O2 MANIFOLD 1 ISOL VALVE CONTROL CIRCUIT	OPEN CIRCUIT, LOSS OF PWR
2259	O2 PRIM ECLSS VALVE 1 SUPPLY CONTROL CIRCUIT	OPEN CIRCUIT, LOSS OF PWR
2261	H2 MANIFOLD 2 ISOL VALVE CONTROL CIRCUIT	OPEN CIRCUIT, LOSS OF PWR

MDAC ID	ITEM	FAILURE MODE
2263	H2 MANIFOLD 1 ISOL VALVE CONTROL CIRCUIT	OPEN CIRCUIT, LOSS OF PWR
2265	O2 MANIFOLD 2 ISOL VALVE CONTROL CIRCUIT	OPEN CIRCUIT, LOSS OF PWR
2273	O2 SECONDARY ECLSS VLV 2 SUPPLY SYSTEM	OPEN CIRCUIT, LOSS OF PWR
2275	H2 HTR CNTL CIRCUIT	OPEN, LOSS OF POWER
2277	O2 HTR CNTL CIRCUIT	OPEN, LOSS OF POWER