INDEPENDENT ORBITER ASSESSMENT

ANALYSIS
OF THE
LIFE SUPPORT &
AIRLOCK SUPPORT
SUBSYSTEMS

02 NOVEMBER 1987

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
ENGINEERING SERVICES

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

WORKING PAPER NO. 1.0-WP-VA87001-02

INDEPENDENT ORBITER ASSESSMENT ANALYSIS OF THE LIFE SUPPORT AND AIRLOCK SUPPORT SYSTEMS

02 NOVEMBER 1987

This Working Paper is Submitted to NASA under
Task Order No. VA87001, Contract NAS 9-17650

PREPARED BY: Jim Arbet
J. Arbet
Lead Analyst
Smoke Detection and
Fire Suppression Subsystems

PREPARED BY: R. Duffy
Lead Analyst
Airlock Support
System

PREPARED BY: Kenneth Barickman
K. Barickman
Lead Analyst
Waste Management
Subsystem

PREPARED BY: M Saiidi
Mo Saiidi
LSS/ALSS Lead
Independent Orbiter
Assessment

APPROVED BY: Anthony J Marino
A.J. Marino
Sectional Manager-FMEA/CIL
Independent Orbiter
Assessment

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

APPROVED BY: J.I. McPherson
J.I. McPherson
Deputy Program Manager
STSEOS

CONTENTS

List of Figures

List of Tables

Independent Orbiter Assessment
Analysis of the Life Support and Airlock Support Systems

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 the independent analysis results corresponding to the Orbiter Life Support System (LSS) and Airlock Support System (ALSS) (Appendix C). All the Electrical Power Distribution and Control (EPDC) hardware items, and the mechanical hardware items are included in this report.

The IOA analysis process utilized available LSS and ALSS 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 breakdown of the two major systems analysed and a summary of the failure criticalities. The data is shown summarized at the subsystem level of the LSS, namely the Supply Water, the Waste Management, and the Smoke Detection and Fire Suppression subsystems. The airlock does not have any major subsystem. The data is also summarized at the system level and then totalled for the LSS/ALSS Analysis Summary. A summary of the number of failure modes by criticality is presented below with hardware (HW) criticality first and then functional (F) criticality second.

Summary of IOA Possible Failure Modes by Criticalities (HW/F)

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
LSS							
o SWS	-	3	36	1	40	59	139
o WMS	9	10	25	3	81	96	224
o SD/FS	8	6	6	12	-	33	65
ALSS	-	7	21	3	17	35	83

LSS/ALSS ANALYSIS SUMMARY					
CRIT	#FM	#PCI	CRIT	#FM	#PCI
1/1	17	17	3/1R	19	2
2/1R	26	26	3/2R	138	7
2/2	88	88	3/3	223	0

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

LIFE SUPPORT SYSTEM					
CRIT	#FM	#PCI	CRIT	#FM	#PCI
1/1	17	17	3/1R	16	0
2/1R	19	19	3/2R	121	7
2/2	67	67	3/3	188	0

AIRLOCK SUPPORT SYSTEM					
CRIT	#FM	#PCI	CRIT	#FM	#PCI
1/1	0	0	3/1R	3	2
2/1R	7	7	3/2R	17	0
2/2	21	21	3/3	35	0

SUPPLY WATER SUBSYSTEM					
CRIT	#FM	#PCI	CRIT	#FM	#PCI
1/1	0	0	3/1R	1	0
2/1R	3	3	3/2R	40	7
2/2	36	36	3/3	59	0

WASTE MANAGEMENT SUBSYSTEM					
CRIT	#FM	#PCI	CRIT	#FM	#PCI
1/1	9	9	3/1R	3	0
2/1R	10	10	3/2R	81	0
2/2	25	25	3/3	96	0

SMOKE DETECTION AND FIRE SUPPRESSION SUBSYSTEM					
CRIT	#FM	#PCI	CRIT	#FM	#PCI
1/1	8	8	3/1R	12	0
2/1R	6	6	3/2R	0	0
2/2	6	6	3/3	33	0

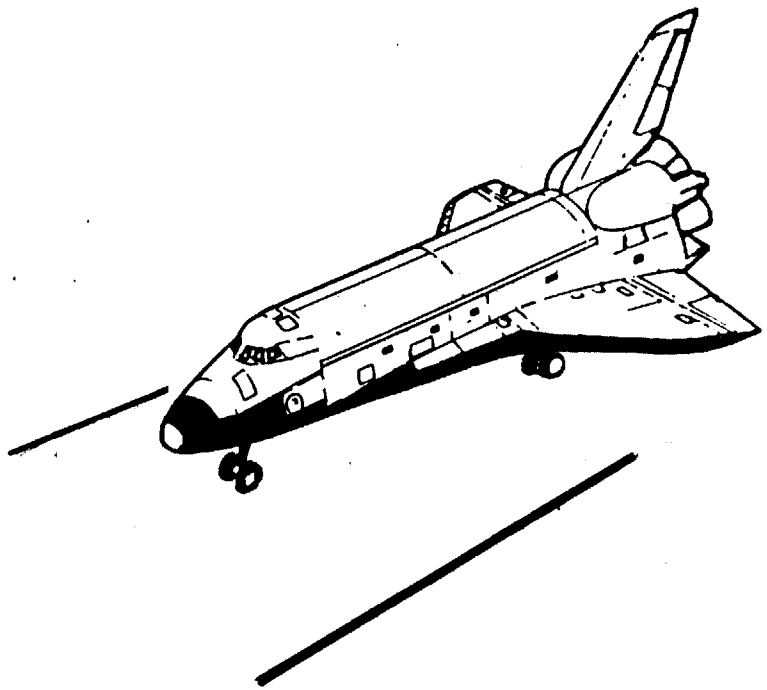


Figure 1 - LSS and ALSS Overview Analysis Summary

For each failure mode identified, the criticality and redundancy screens were examined to identify potential 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
LSS						
o SWS	-	3	36	-	7	46
o WMS	9	10	25	-	-	44
o SD/FS	8	6	6	-	-	20
ALSS	-	7	21	2	-	30

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 assessment 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 LSS and ALSS Ground Rules and Assumptions

The LSS and ALSS ground rules and assumptions used in the IOA are defined in Appendix B.

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The LSS provides for the management of the supply water, collection of the metabolic waste, management of the waste water, smoke detection, and fire suppression. The ALSS provides water, oxygen, and electricity to support an Extra vehicular Activity (EVA) in the airlock. Below is a brief description of each of these categories.

1. Supply Water Subsystem - The SWS provides ullage for the storage of the fuel cells generated water and the management of this water throughout the mission. The water is used to meet the Flash Evaporator System (FES) requirement, crew usage, and EVA requirement. For the purpose of this study the SWS was divided into five main assemblies as shown in Figures 2 through 5.

   The tank assembly is made up of four tanks (A, B, C, and D) and associated plumbing which interconnects them as shown in Figure 2. Each tank is constructed of thin-wall aluminum with Inconel steel bellows pressurized by the gaseous nitrogen from the Atmospheric Revitalization Pressure Control System (ARPCS). Each tank can be isolated from the line by an inlet valve and an outlet valve in the event of a leak. The fuel cells generated water flows into the tanks A, B, C, and D respectively after passing through two hydrogen separators. The flow to a given tank is accomplished automatically by use of two 1.5 psid relief valves. Before flowing into the Tank A the water passes through a microbial filter/check valve which prevents passage of micro-organisms into the potable water tank.

   The galley line assembly contains the plumbing for the transport of the potable water from Tank A to the Environmental Control and Life Support System (ECLSS) bay for connection to the galley or the water dispenser as shown in Figure 3. The water is avaiable at the bay either directly (70 F) or chilled. Chilled water is accomplished by interfacing the potable water with the ARS water coolant loops through a heat exchanger called water chiller.

   The FES line assembly is comprised of two separate FES feed water lines supplying water to meet FES requirement as shown in Figures 4 and 5. The two lines may be isolated from each other by a crossover valve or an isolation valve on Line B. All the associated hardware beyond this isolation valve is considered as part of the ATCS analysis, and therefore not covered in this report.

   The dump line assembly, shown in Figures 2 and 4, provides for expulsion of excess water through a dump nozzle during on-orbit dump operation. The line incorporates an isolation valve, a dump valve, and line and nozzle heaters. Also,

capability exists to cross-tie the supply water dump line to the waste water dump line in the event one dump line becomes inoperative. The line and nozzle heaters provide thermal conditioning of the dump line and nozzle to prevent ice formation in the area. The line heaters are thermostatically controlled.

The gaseous nitrogen line assembly pressurizes the tanks with the nitrogen from the ARPCS storage tanks as shown in Figure 3. Cabin atmosphere may also be used to pressurize the tanks if the GN2 pressurization is lost. Most of the hardware in this assembly are covered in the ARPCS analysis except for the Tank A pressure/vent panel which is included in this report.

2. Waste Management Subsystem - The WMS is made up of Waste Collection Subsystem (WCS), Waste Water Subsystem (WWS), and the Vacuum Vent Subsystem (VVS) as shown in Figure 6. These subsystems are used in an integrated process for the collection and storage of the crewmember biowaste and the overboard dumping of the waste fluid and gases. The schematics for these subsystems are shown in Figures 7 through 10.

The WCS, shown in Figure 7, is an integrated multifunctional zero-g device used to collect and process biowaste from the crewmembers, gases from the wet trash stowage area, and waste water from the EMU/Airlock support station. The WCS accomodates both male and female crewmembers and is comprised of the commode assembly, urinal assembly, interconnecting plumbing, mounting framework, crew restraints, and instrumentation. The subsystem uses a system of valves to direct cabin air flow through the urinal and fecal collection systems to draw the biowaste into the collection chamber. In the case of the waste fluids, a centrifugal separator is used to separate the waste fluids from the transport air flow. The waste fluids are then directed into the waste water subsystem and the separated air passes through the muffler assembly for bacteria and odor removal. This air is then injected into the crew cabin atmosphere. The WCS incorporates two redundant fan/separator units with one unit being operational at a time.

The WWS, shown in Figure 8, provides storage and overboard dump capability for urine, atmospheric condensate, EMU waste water, and contingency cooling water to the FES. The waste water storage is a single thin wall aluminum tank shell surrounding an Inconel steel bellows. The tank is identical to the supply water tanks. The bellows is pressurized with nitrogen gas to facilitate waste water expulsion. All tubing is stainless steel. Flow control into and out of the tank is via the inlet valve. The outlet valve is used only during GSE operation. Both valves are electrically operated solenoid latching type valves.

The WWS provides control for the overboard dump of the waste water through a dump nozzle at the mid fuselage as shown in Figure 9. All plumbing exterior to the crew module is protected by electrical heaters and thermal insulation. The subsystem also contains a provision to cross-tie the waste dump line to the supply water dump line which make it possible to provide waste water to the FES or supply water dump nozzle under contingency cases. The use of the supply water dump line or FES line poses serious contamination problems. Further, a Contingency Water Container (CWC) is flown which provides additional ullage to the waste water tank, but has not been used nor flight tested.

The VVS, shown in figures 10, provides voluntary and involuntary venting of the ECLSS gases. Voluntary use of the vacuum vent occurs during airlock and cabin depressurization, and the WCS use. During on-orbit operation, the VVS may also be utilized in order to regain automatic pressure control of the cabin atmosphere in the event that the cabin pressure should exceed 14.7 psia. Involuntary venting is available for hydrogen gas from the H2/H2O separators, fecal vapors from the WCS, and wet trash vapors from the trash stowage.

The VVS consists of a 2.0 inch O.D., 302 stainless steel duct, two independent line heaters, thermostats, an isolation valve, a single nozzle heatr, and a 1.93 inch O.D. nozzle. The isolation valve was analyzed under the ALSS in this report. The line heaters are continuously wrapped together for the full length of the line. Each of the heaters contains a single thermostat.

3. Smoke Detection and Fire Suppression Subsystems - These two subsystems are emergency subsystems within the shuttle Caution and Warning (C&W) system. The smoke detection uses electronic sensors to provide on-board warning of an impending fire pre-smoke phase. Indications are provided through a light matrix, siren tone, and various CRT data. Fire suppression is provided by fire suppressant (Halon) bottles to suppress the ignition source. The schematic for these subsystems are shown in Figures 11 through 14.

The Smoke/Detection Subsystem consists of nine smoke detectors. A typical detector is shown in Figures 11. Six detectors provide redundant sensing within Avionics Bays 1, 2, and 3 and three detectors sense the cabin atmosphere. Each avionics bay has two redundant sensors (Sensors A&B). The cabin sensors are two sensors in the flight deck at the left and right return air ducts, and one sensor in the cabin fan plenum outlet. The cabin fan plenum sensor is considered to provide redundancy to the left and right flight deck sensors. Further, a fire sensed by the left or right sensor will be followed by an indication on the cabin sensor. Another input is also available for certain types of payloads such as Spacelab modules.

Smoke detection operation is based upon sensing of invisible submicron particles emitted from materials subjected to abnormal energy levels. The detectors measure current flow in a measuring chamber, and the current flow in a reference chamber, shown in Figure 12. Air molecules in each chamber are ionized by a radiation source and in the measuring chamber the interaction of particles with the air molecules reduces current flow. The difference in the level sensed provides an indication of the particle level present. If either a preset level (2000+/- 200 micro g per m3) for five seconds or an increase in rate build-up (22 micro g per m3 per sec) for twenty seconds is maintained, then a continuous alarm signal is output until a reset signal is issued. The system is powered from circuit breakers on Panel 014, 015, and 016. The indicator light matrix is located on Panel L1A1 in the CDRs station and CRT data is available on the flight deck CRTs. The siren alarm is output through speakers in the flight and middeck and through headset assemblies via the Audio Terminal Units.

A test circuit controlled by a switch on Panel L1A1 provides for sensor and alarm checkout. The actual sensing capability is not checked but the electronics which process the measuring and reference chamber current outputs are verified by inducing signals representative of the sensor trip levels. Reset of a test or actual sensor trip is through a switch also located on Panel L1A1. In this test mode, three conditions must be present to indicate an operable sensor namely: pump running, particle concentration, and the particle rate of change greater than the preset levels.

The Fire Suppression Subsystem consists of three permanently mounted fire suppressant bottles mounted in Avionics Bay 1, 2, and 3. A typical bottle is shown in Figure 13. These bottles are permanently attached within each bay and remotely activated from panel L1A1 since access to the bay is difficult. Activation requires an Arm/Fire Pyrotechnic Initiator Controller (PIC) sequence from a switch and push-button indicator. A pressure switch on the bottle is used to indicate bottle discharge. The power for the system comes through circuit breakers on panels 014, 015, and 16. The agent discharge indication is part of the Push-Button indicator on Panel L1A1. The PIC capacitor voltage and bottle empty indications are telemetered to the ground. In addition to the permanently mounted bottles, the crew has available portable bottles mounted in the crew compartment. A typical portable bottle is shown in Figure 14. These are used by the crew to dispense suppressant to the source of ignition within the cabin area and behind panels through the fire holes.

4. Airlock Support System - The airlock is a modular cylindrical structure with two hatch openings as shown in Figure 15. It provides oxygen, water, and electrical interfaces to accomodate EVA operation. It is also equipped with pressure equalization valves on each hatch and a decompression system. The vacuum vent isolation valve is also included with the airlock analysis even though it is mounted at the Xo576 bulkhead.

The interface between the airlock and an Extravehicular Mobility Unit (EMU) is provided by the Service and Cooling Umbilical (SCU), shown in Figure 16. The SCU is composed of hoses and electrical wiring to supply the oxygen, water, and electricity to the EMU while in the airlock. The SCU also contains valving which allows supply and waste water flow through a single connection at the SCU/EMU interface. The SCU is bolted to the airlock, leak proved and checked prior to launch and is permanently attached for the duration of the mission.

The oxygen interface is used by the crew while in the airlock and it is used to recharge the EMU oxygen tanks. The water in the three EMU tanks can be dumped through the SCU into the orbiter waste water tank and the quantity observed on the orbiter water tank gauge. They are then refilled from tank C of the supply water system. During the refilling process (approximately 15 minutes), the supply water system crossover valve is opened, the FES is disabled and tank C is isolated so the quantity of water loaded into the EMU can be checked by the tank C gauge.

The airlock depressurization is controlled by a three position valve, the valve and system are shown in Figures 16 and 17. The valve is connected to a 2 inch, stainless steel, overboard vacuum vent line. The closed position prevents any airflow from escaping the airlock. The second position, labeled "5", opens the smallest orifice which allows the pressure to decrease to 5 psi at an initial rate of 0.09 psi/sec. The third valve position, labeled "0", reduces the airlock pressure to 0.2 psi. At this pressure the airlock can be opened. When not in use, the valve is covered with a pressure/dust cap. Prior to removing the cap, it is necessary to equalize the pressure across it with the cap vent valve.

The airlock repressurization is controlled by two pressure equalization valves on the hatch to the cabin, a typical set is shown in Figure 17. Normal repressurization is accomplished by placing one valve in the "normal" position. When completed, the airlock and the cabin are pressurized to approximately 14 psia. The orbiter environmental control system will automatically compensate for the lower pressure and repressurize the cabin and airlock to 14.7 psia. The equalization valves on the payload bay hatch may be used to depressurize the airlock in the event of depress valve failure.

The EMU power supply/battery charger provides 17.0 volts dc at 5 amps at the airlock interface. The Electrical System is shown in Figure 18. MAIN Bus A or B must be selected with the bus select switch and the mode selection switch must be in the POWER position to supply the power to the SCU. The mode switch in the POWER position makes the power available at the SCU connector and also closes a circuit that provides a battery feedback voltage charger control. This circuit inhibits EMU power when any discontinuity is sensed in the SCU/EMU circuitry. The mode switch in the POWER position also supplies power through the SCU for the EMU microphone amplifiers for hardline communication.

The vacuum vent isolation valve is mounted at the Xo576 bulkhead which provides capability to isolate the waste management vent lines and the airlock vent line. However, the valve has an internal bleed port to vent the hydrogen separator and waste collection gases when it is in the closed position. The valve is designed to close within 2 seconds in the event of an excessive cabin pressure loss rate. This is accomplished via the cabin oxygen system 1 and 2 flow sensor circuitry. The valve can also be opened on demand through a bus selection and control switches (S10 & S11) mounted in the panel ML31C and shown in Figure 19.

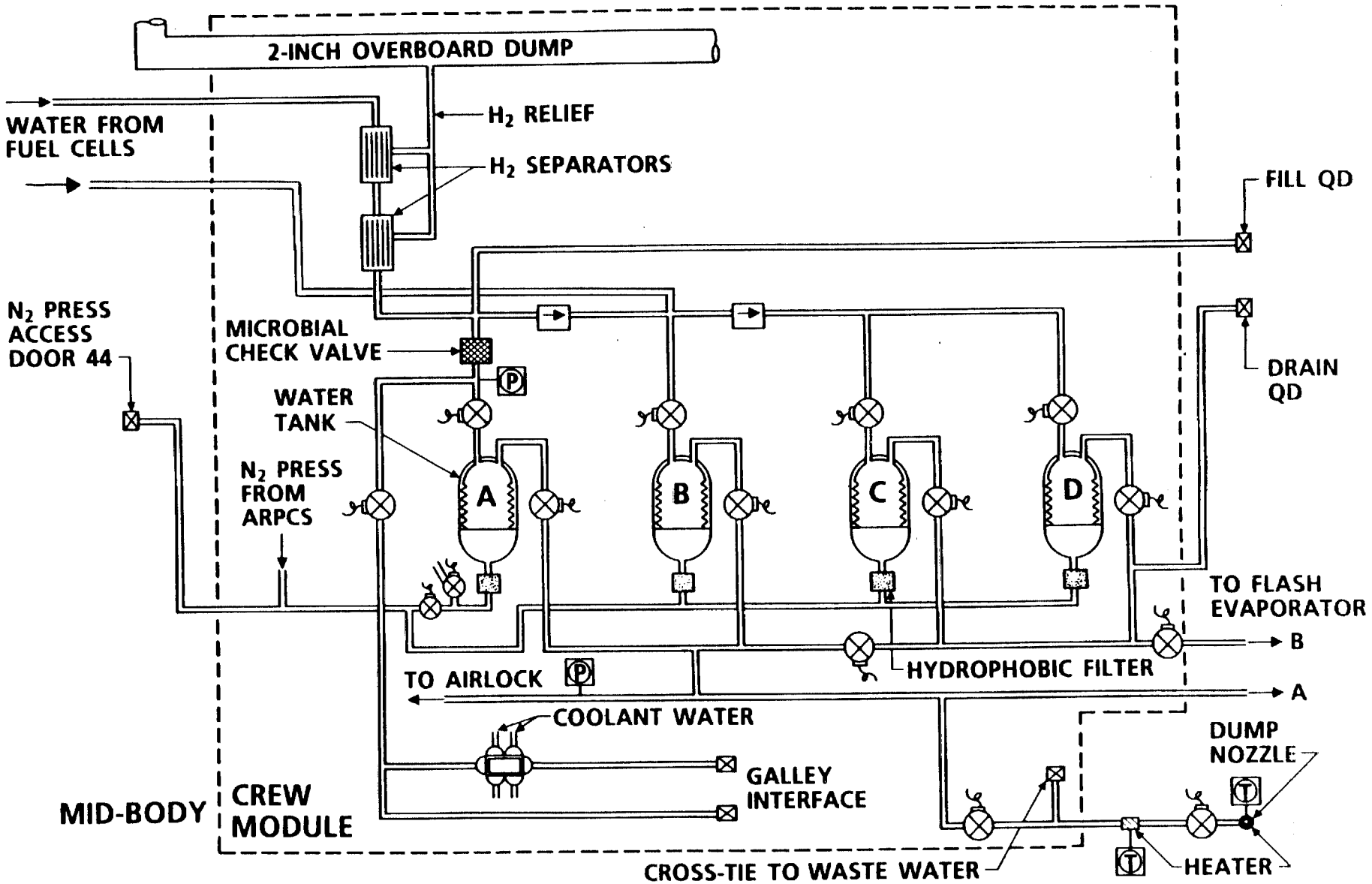


Figure 2 - The Supply Water Subsystem Schematic

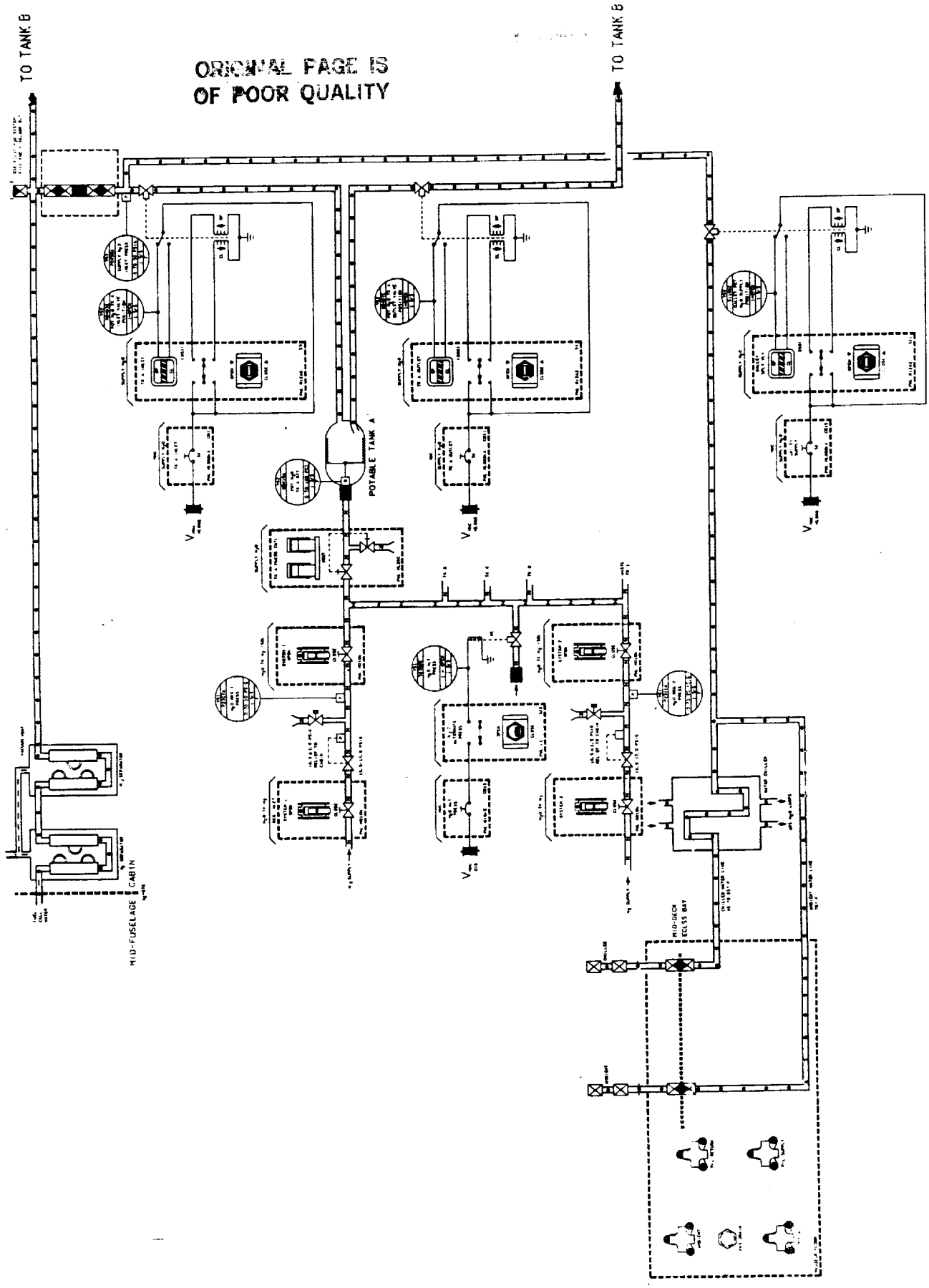
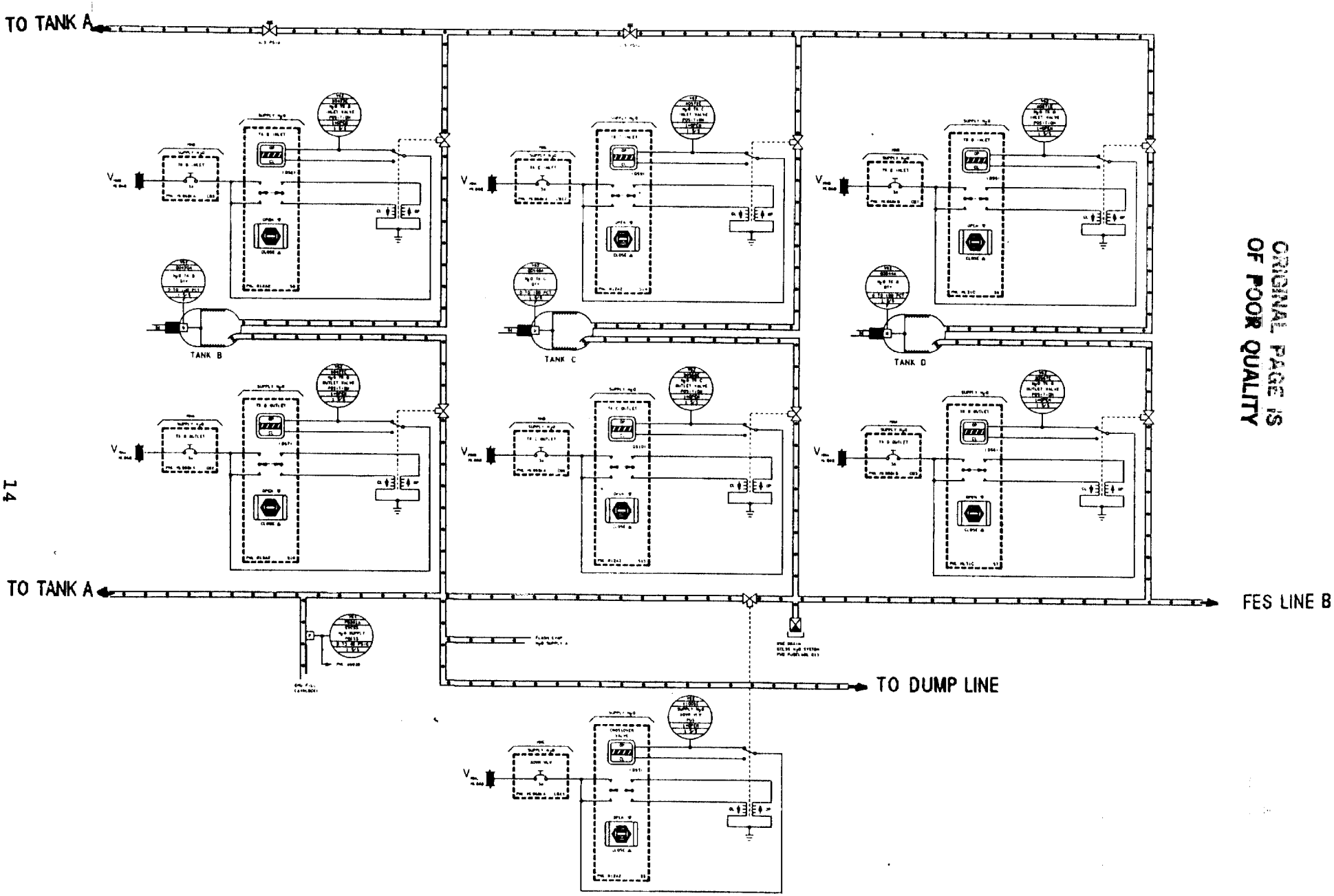


Figure 3 - Supply Water Pressurization and Galley Lines



ORIGINAL PAGE IS
OF POOR QUALITY

Figure 4 - Supply Water Tanks B, C, and D Configuration

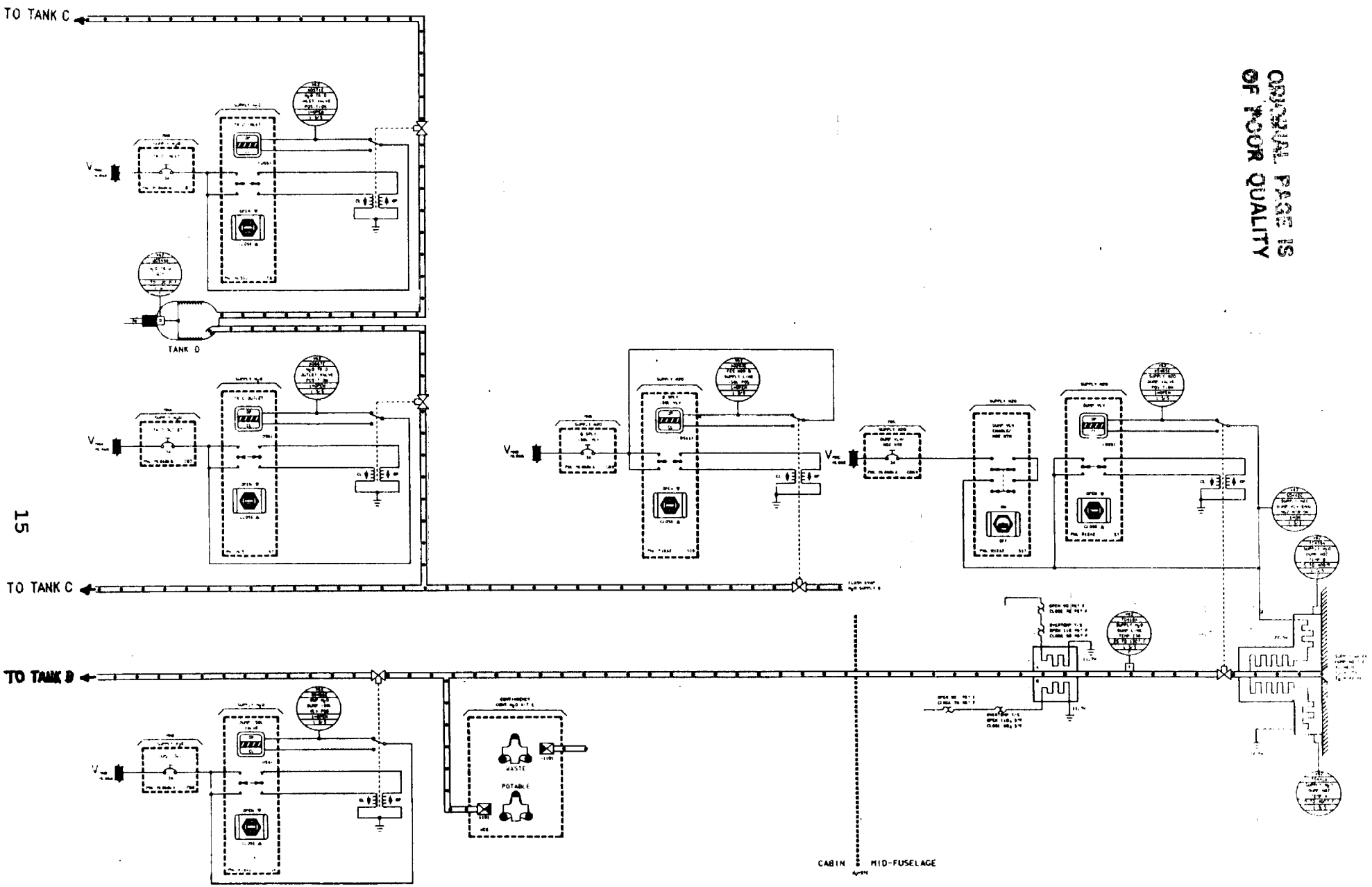


Figure 5 - Supply Water FES and Dump Lines

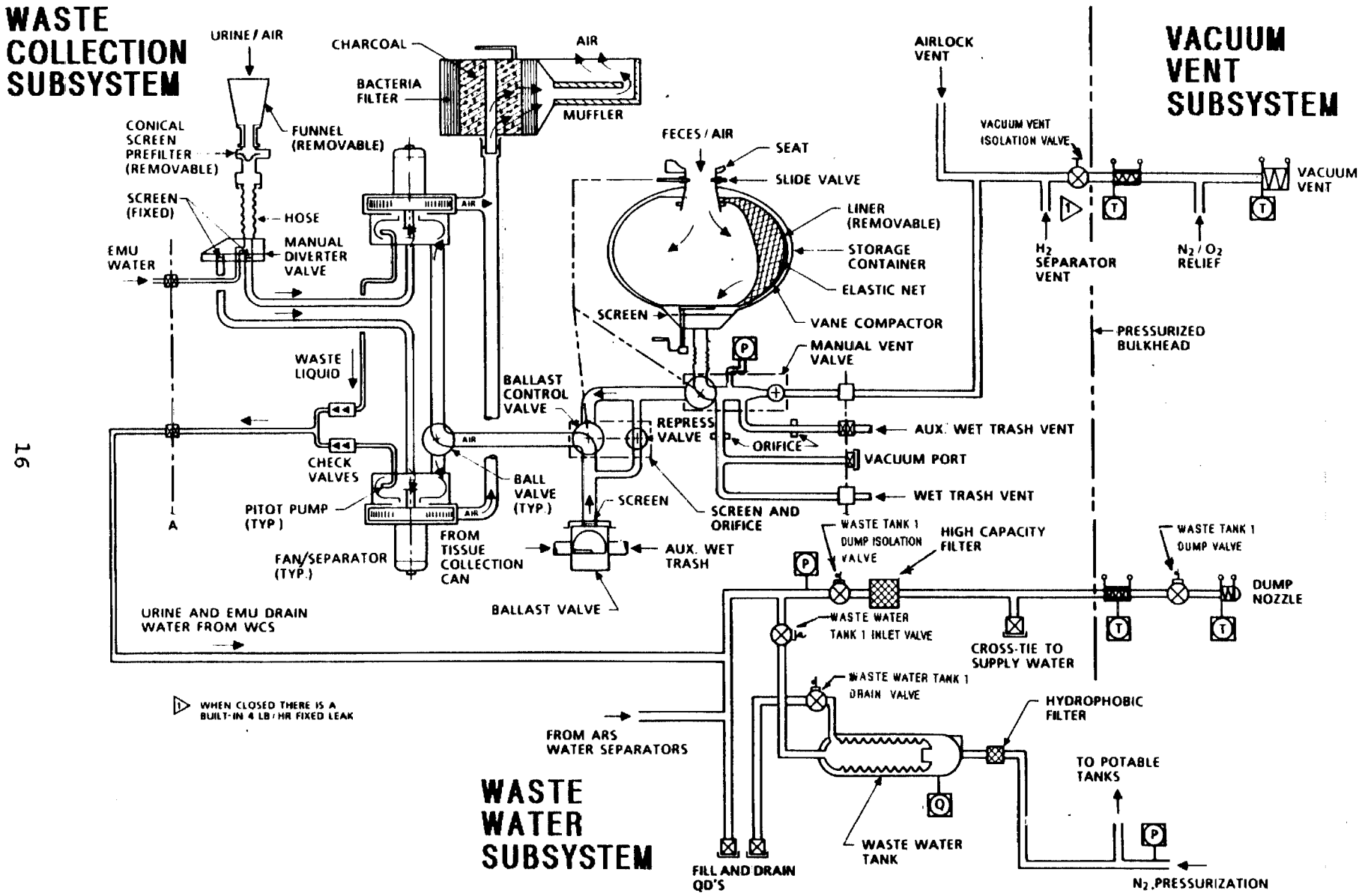


Figure 6 - Waste Management Subsystem Integrated Schematic

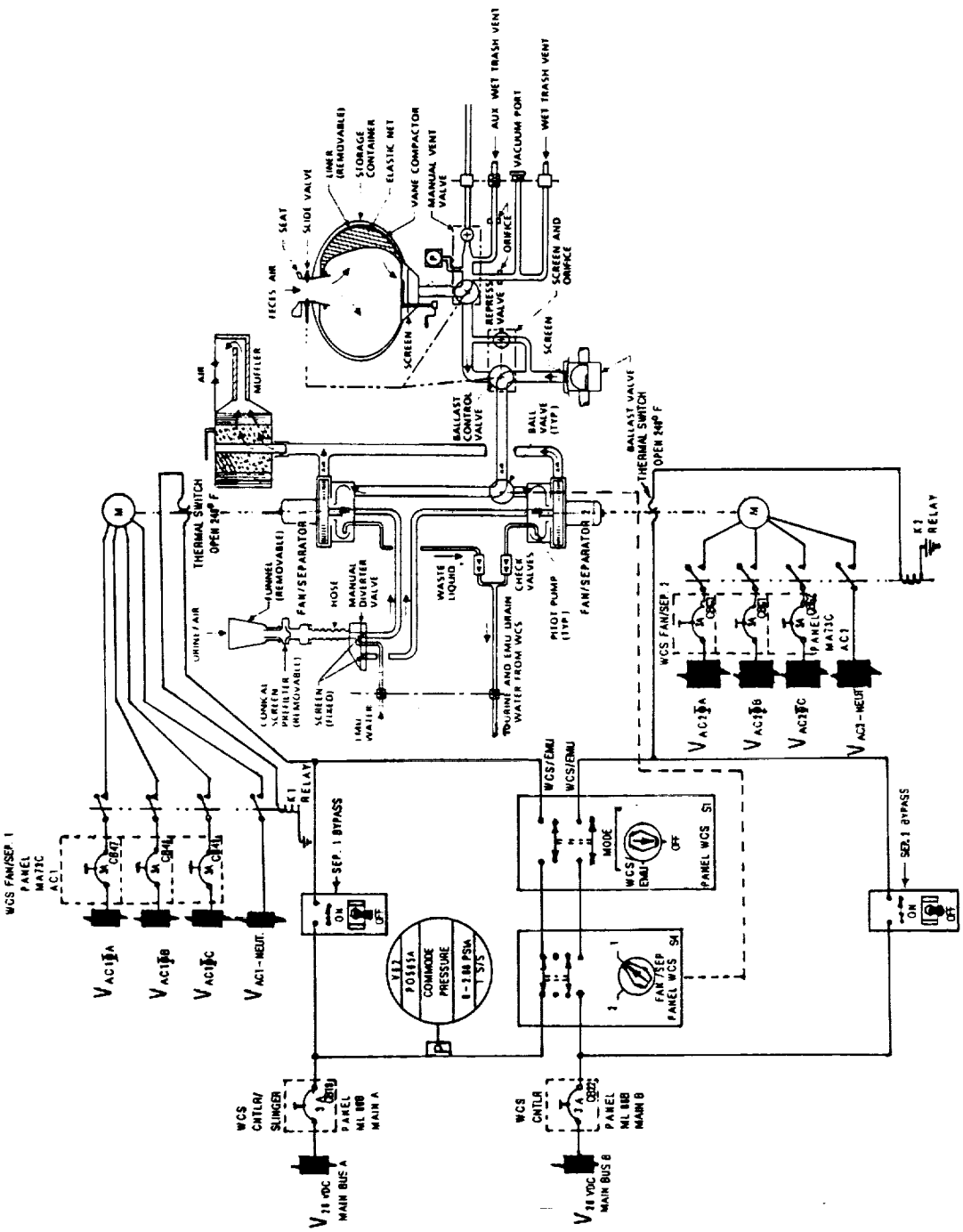


Figure 7 - Waste Collection Subsystem Schematic

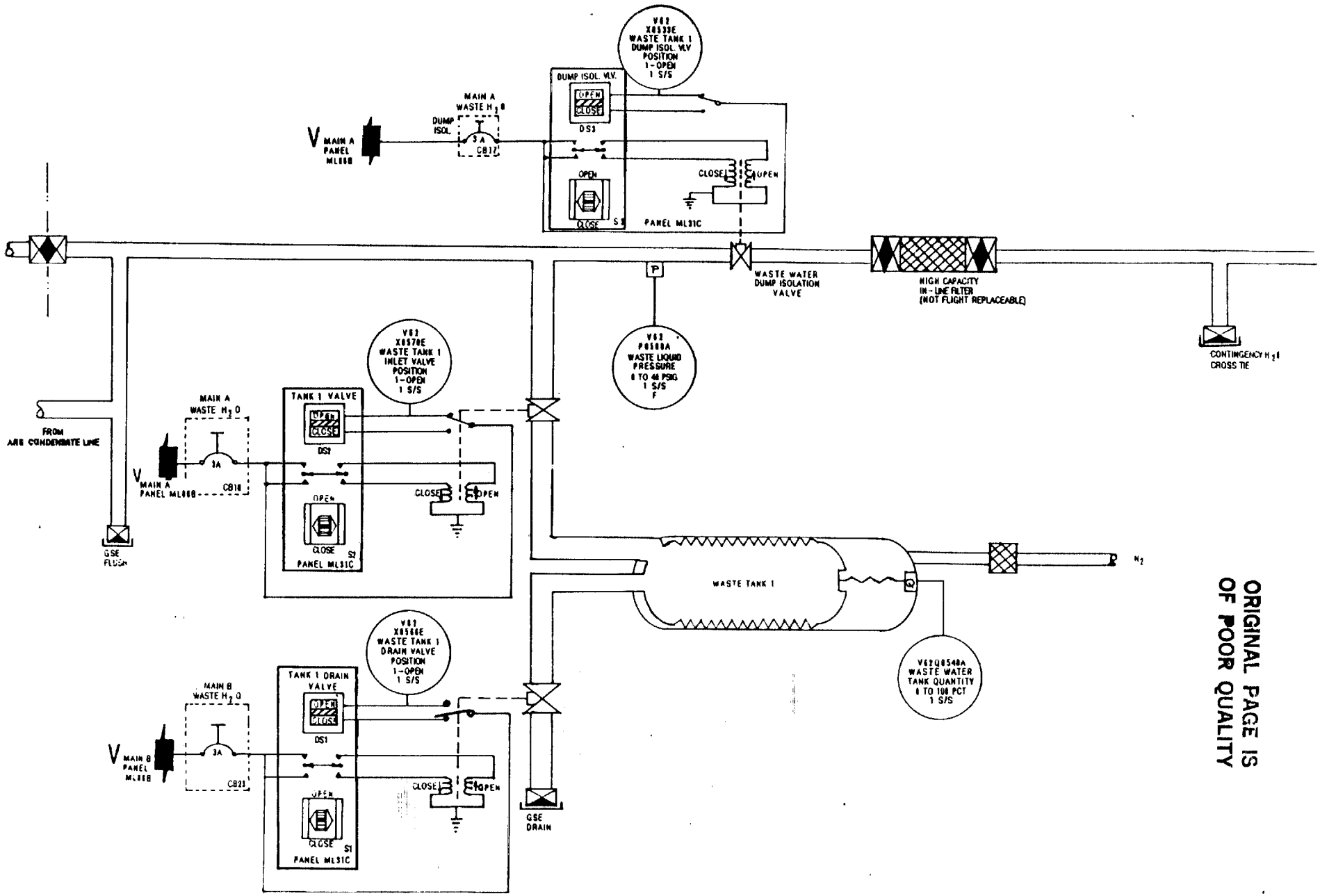


Figure 8 - Waste Water Subsystem Storage Assembly Schematic

ORIGINAL PAGE IS
OF POOR QUALITY

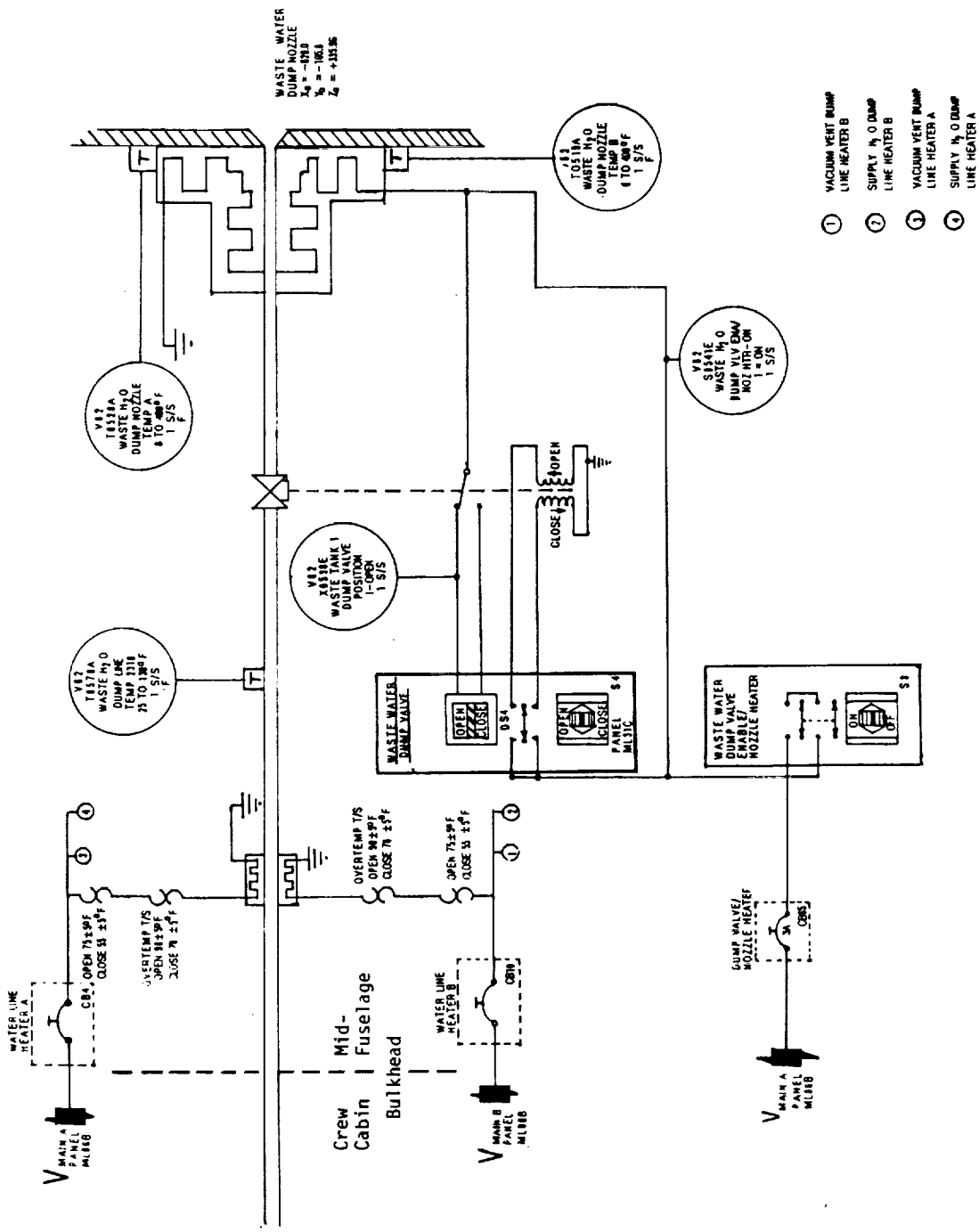


Figure 9 - Waste Water Subsystem Dump Line Assembly Schematic

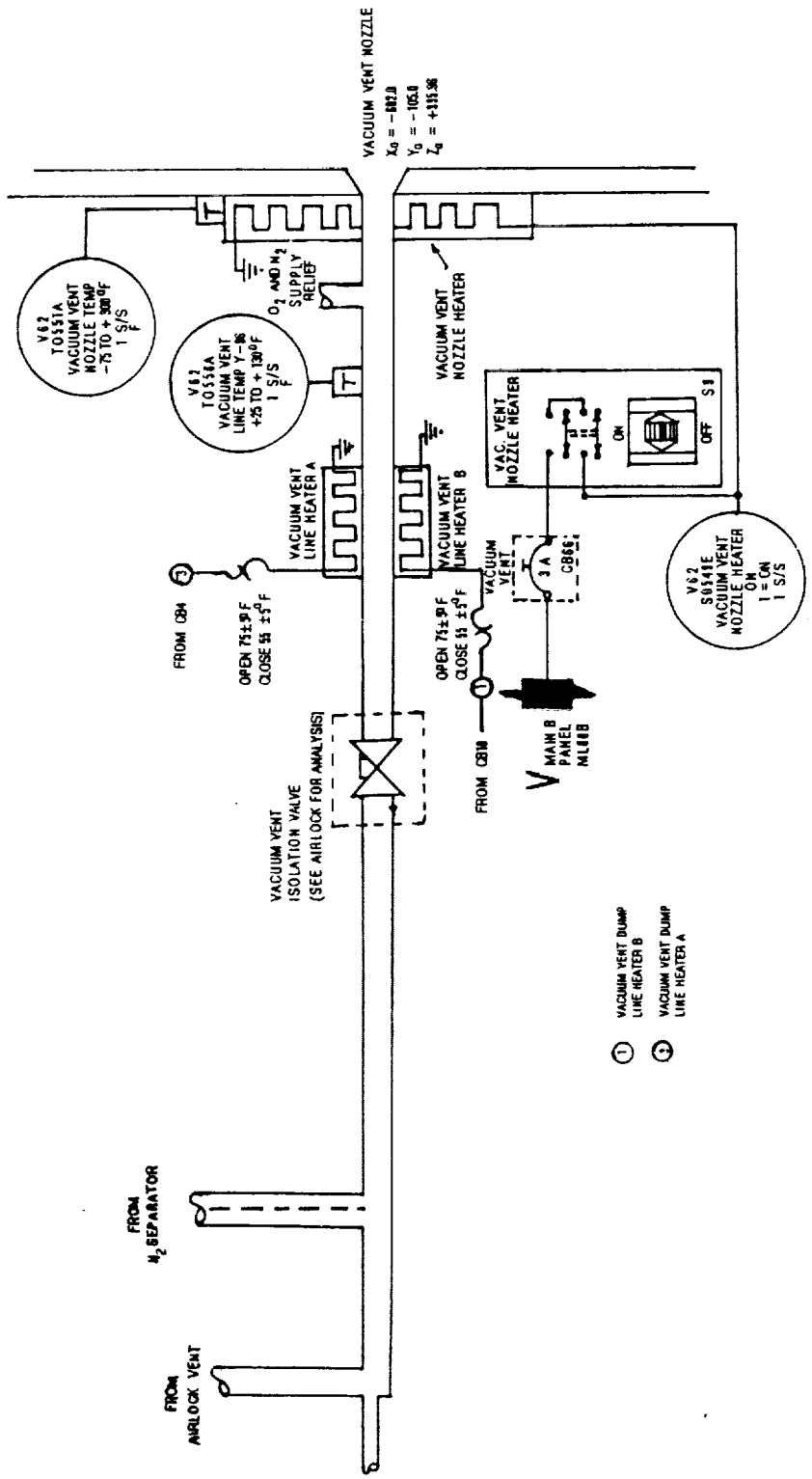


Figure 10 - Vacuum Vent Subsystem Schematic

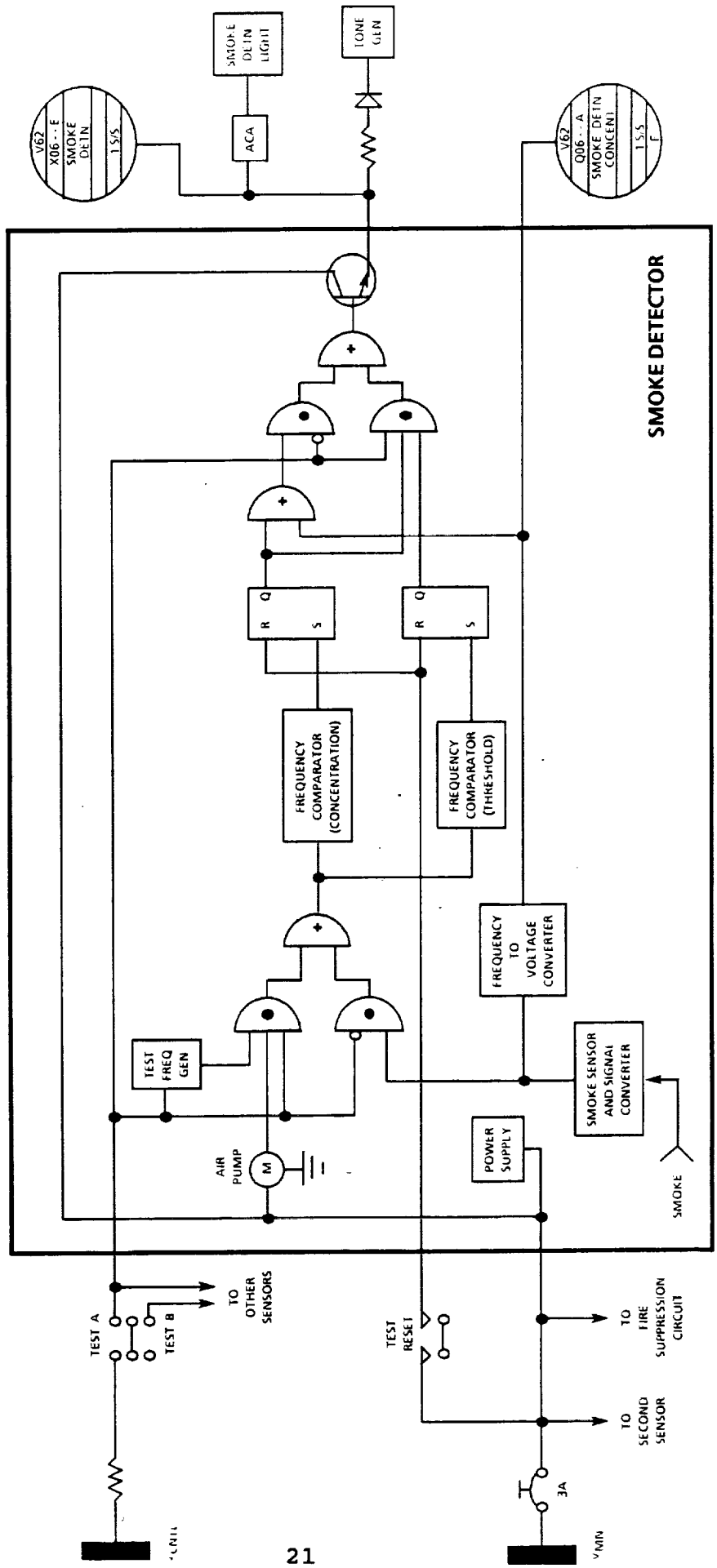


Figure 11 - Typical Smoke Detector Schematic

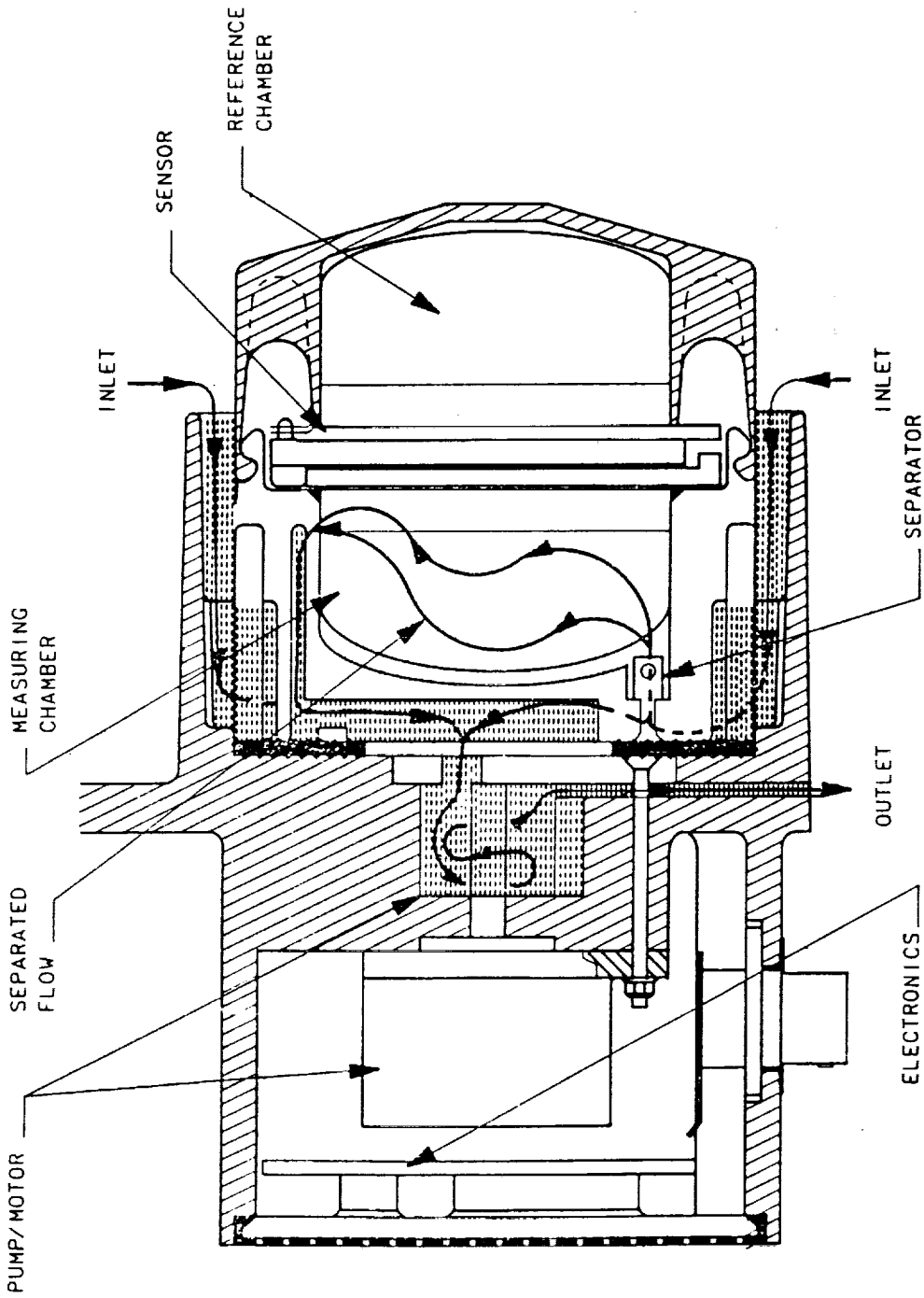
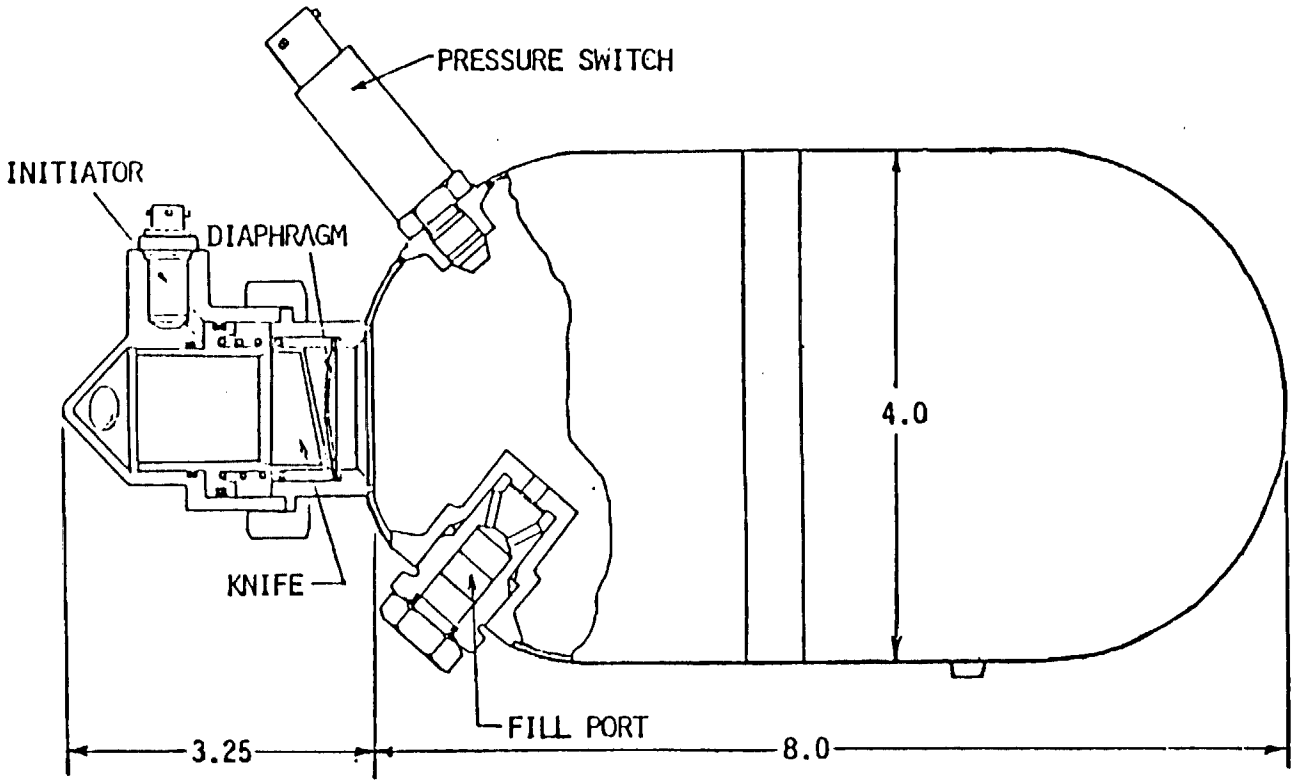
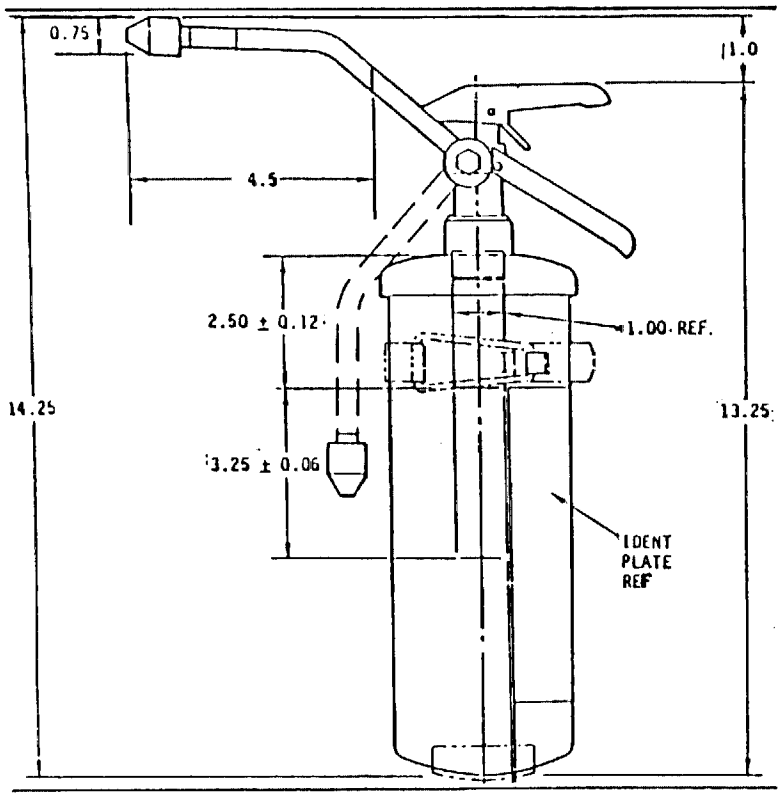


Figure 12 - SD/FS Typical Smoke Detector



CHARGE - 3.75 LBS FE 1301
DISCHARGE TIME - 1 SEC

Figure 13 - SD/FS Active Fire Suppressant Bottle



PORTABLE FIRE EXTINGUISHER

TOTAL WT. 6.6 LBS
FREON 1301 WT. 2.8 LBS.
BASIC DESIGN MIL-E-52031B (ME)
DISCHARGE TIME

1-G	16 ±2 SEC.
0-G	30 ±5 SEC.

Figure 14 - SD/FS Portable Fire Extinguisher

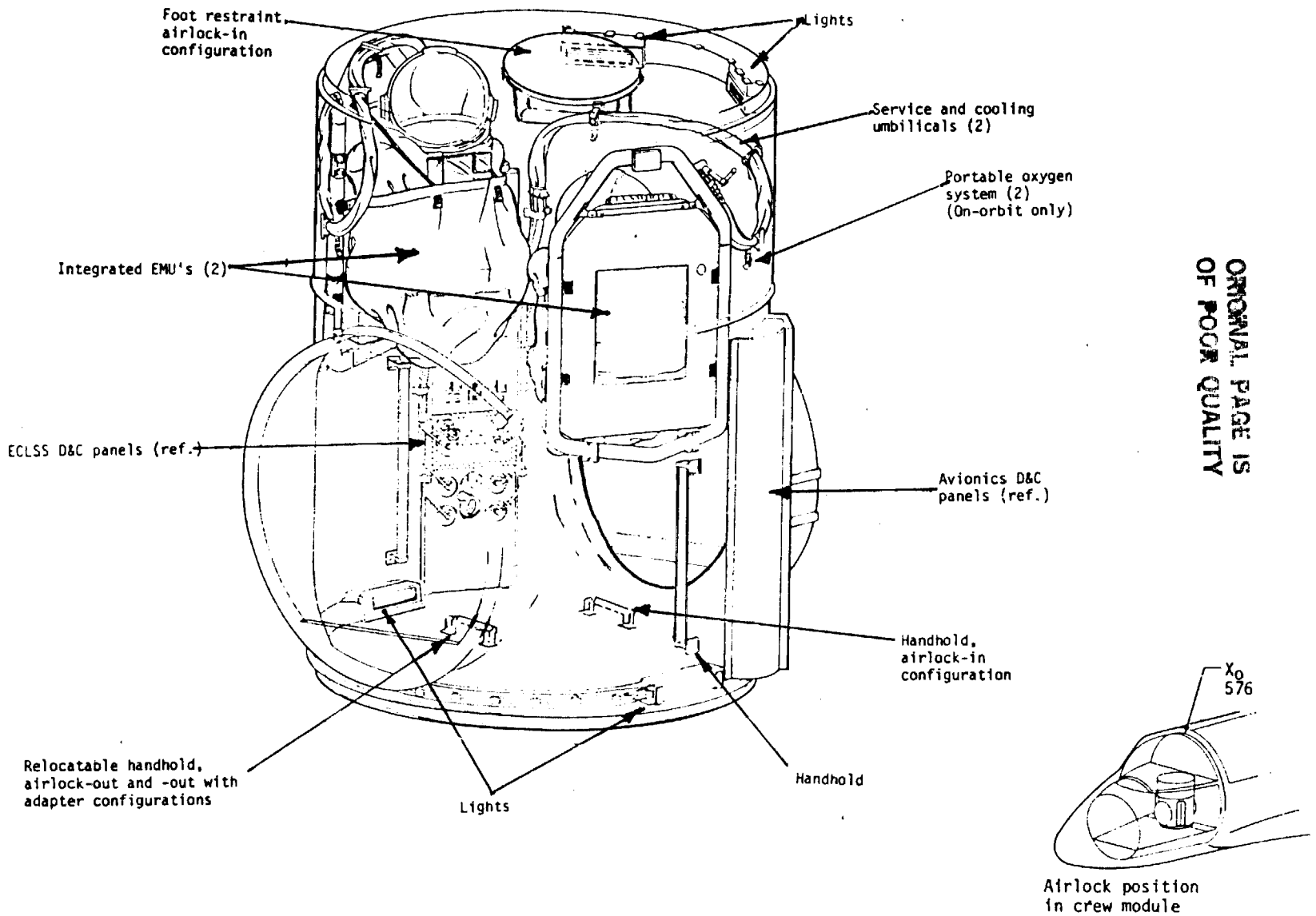


Figure 15 - Airlock Support System

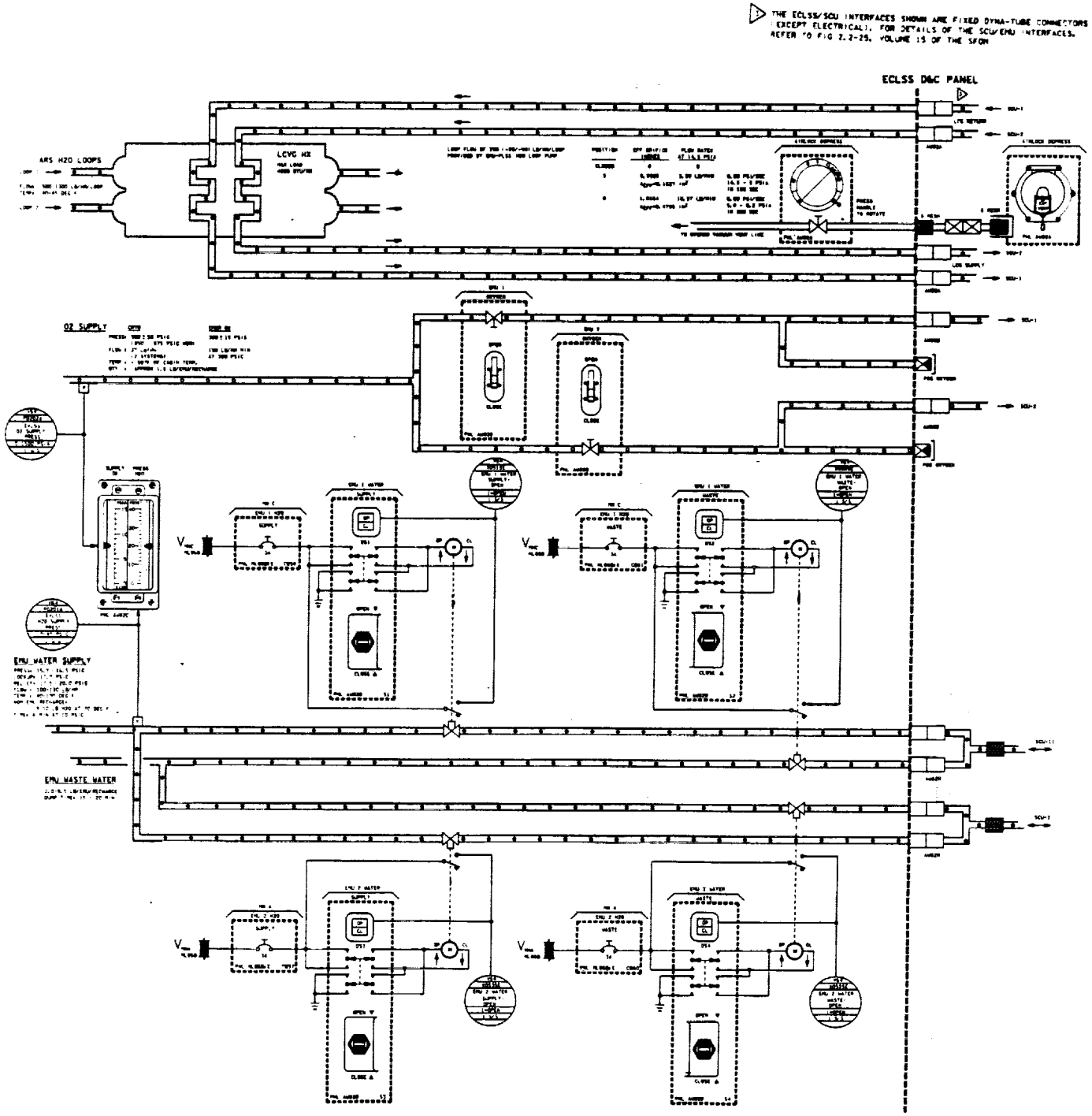


Figure 16 - Airlock Piping And Instrumentation Diagram

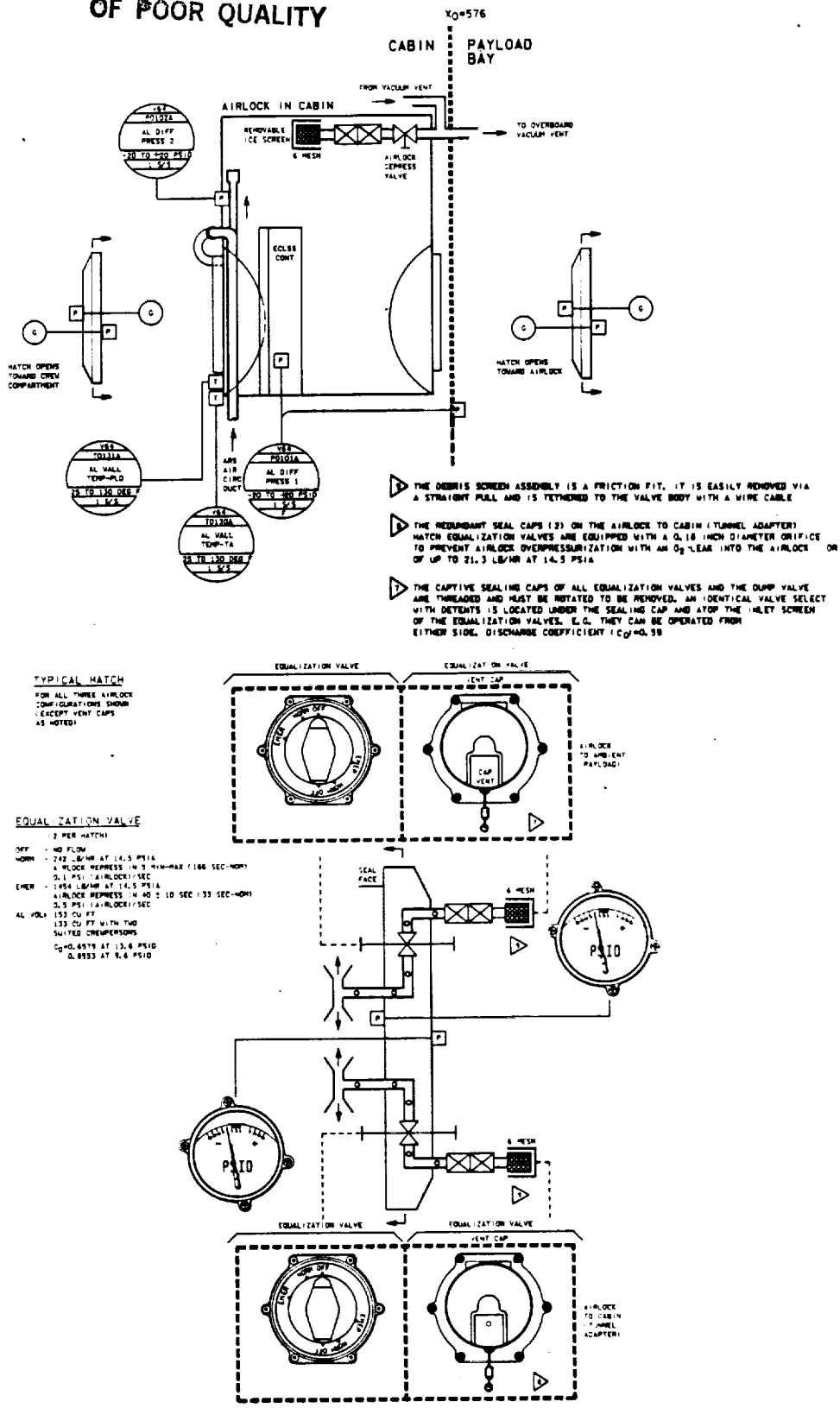


Figure 17 - Airlock Vacuum Vent and Pressure Equalization Valves

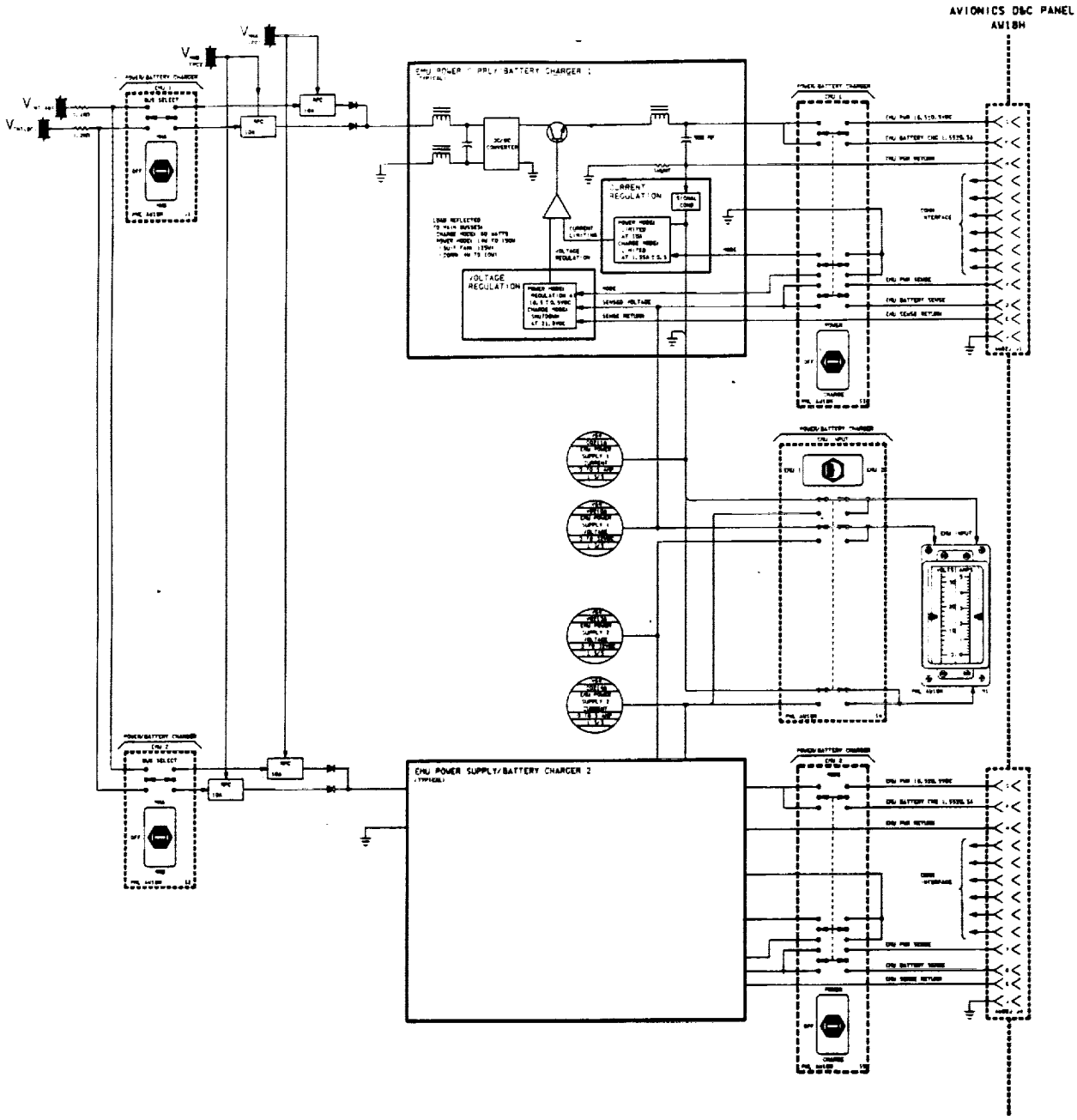


Figure 18 - Airlock Electrical Schematic

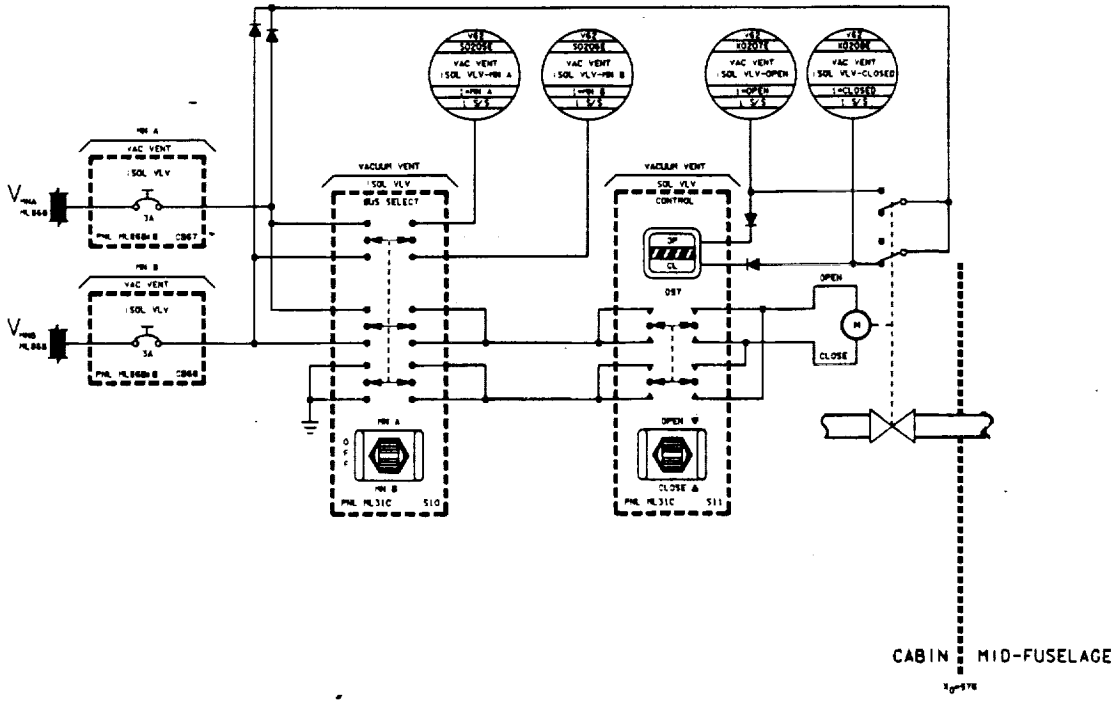


Figure 19 - Vacuum Vent Isolation Valve

3.2 Interfaces and Locations

The life support and airlock support items are located at various places within the crew compartment, and avionics bays as shown in Figures 20 to 22. The FES and dump nozzles are located outside the payload bay past 576 bulkhead.

The LSS and ALSS interfaces with the adjoining subsytems were identified, and are explained below:

1. EPS - The Electrical Power Subsystem provides bus power to drive valves, switches, instrumentation, and heaters throughout the systems. Also, the EPS recharges the EMU batteries in the airlock at the SCU.

2. ARPCS - Gaseous nitrogen from the ARPCS storage tanks are used to pressurize the supply/waste water tanks. It is also used to recharge the MMU nitrogen tanks. Cabin pressure may be used to maintain pressure in the water tanks in the event that gaseous nitrogen is not available.

3. ARS - The water coolant loops from the ARS chills the potable water through the water chiller heat exchanger. They are aloso used to cool the EMU suites while in the airlock.

4. ATCS - The Flash Evaporator System (FES) uses water from the water tanks to provide thermal cooling of the freon loops.

5. PRSD - The Power Reactant Storage and Distribution System provides oxygen for recharge of the EMU bottles in the airlock at the SCU interface.

6. EMU - The EMU interfaces with the ALSS through the SCU for water, oxygen, and electrical power recharges.

7. CE - Crew Euipment such as galley or water dispenser is connected to the potable lines at the ECLSS bay in the crew compartment.

3.3 Hierarchy

Figures 23 and 24 illustrates the hierarchy of the LSS and ALSS hardware and the corresponding subcomponents.

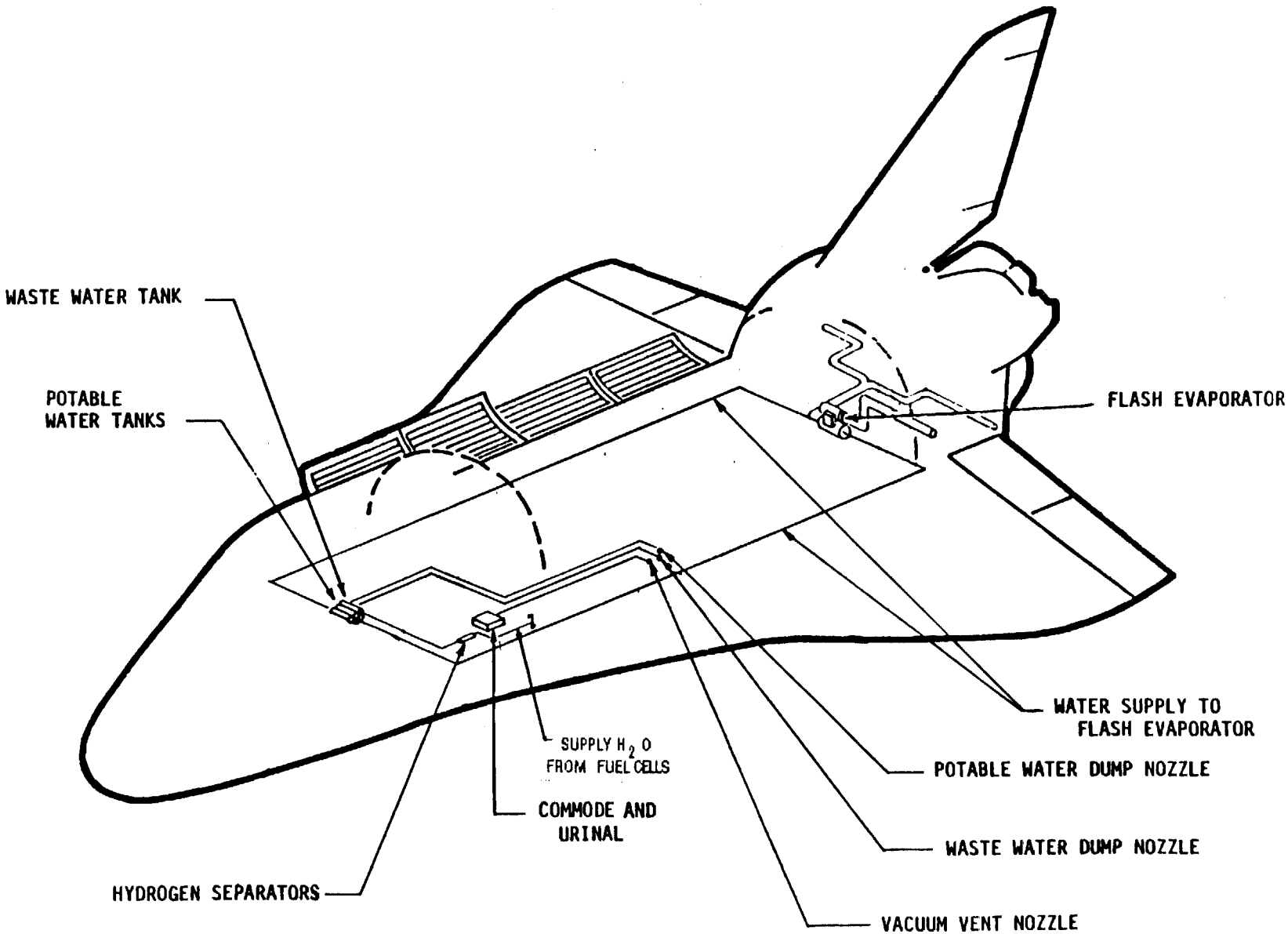


Figure 20 - General Location of the Supply and Waste Management Subsystems

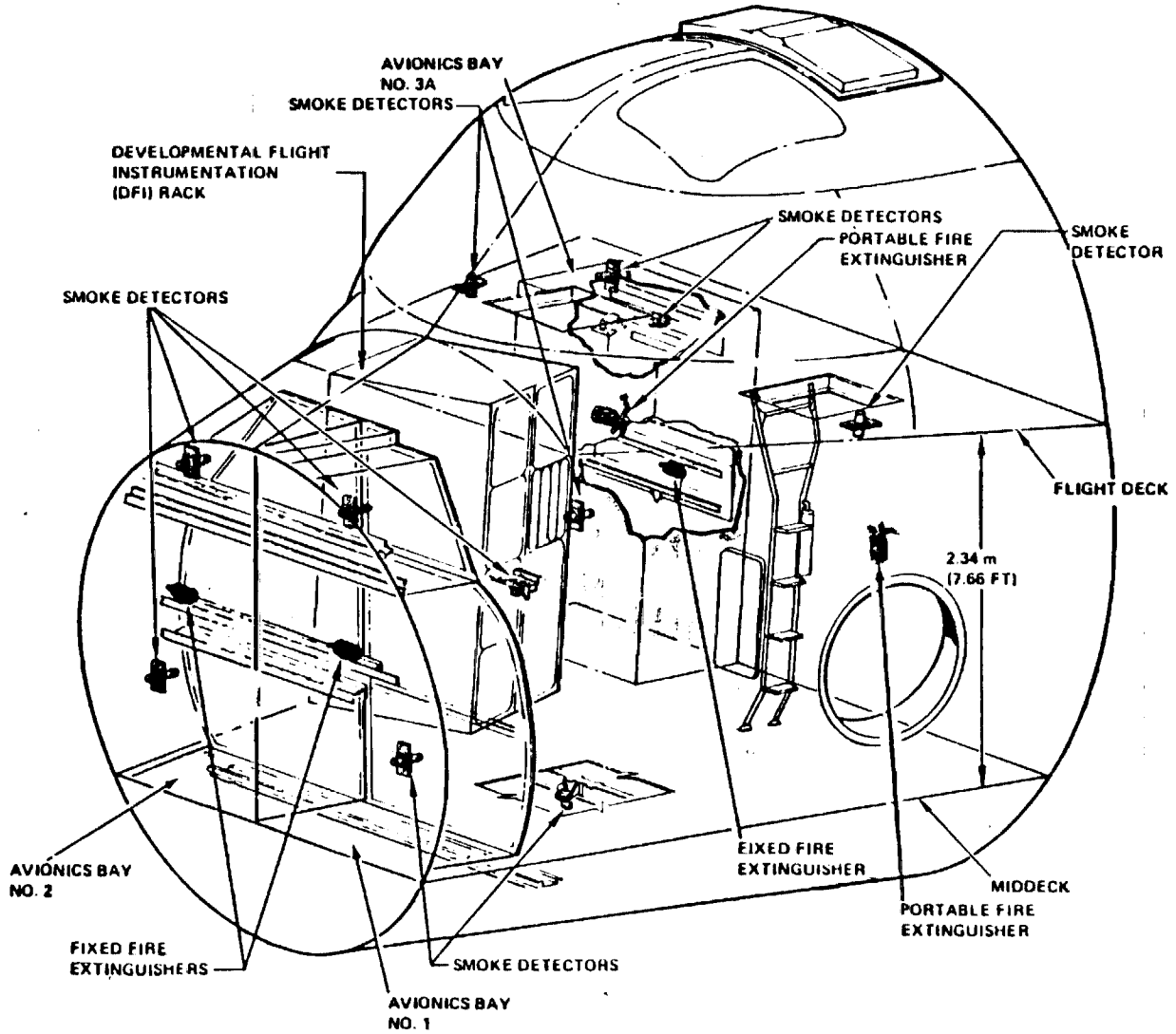


Figure 21 - General Location of the Smoke Detection and Fire Suppression Subsystems

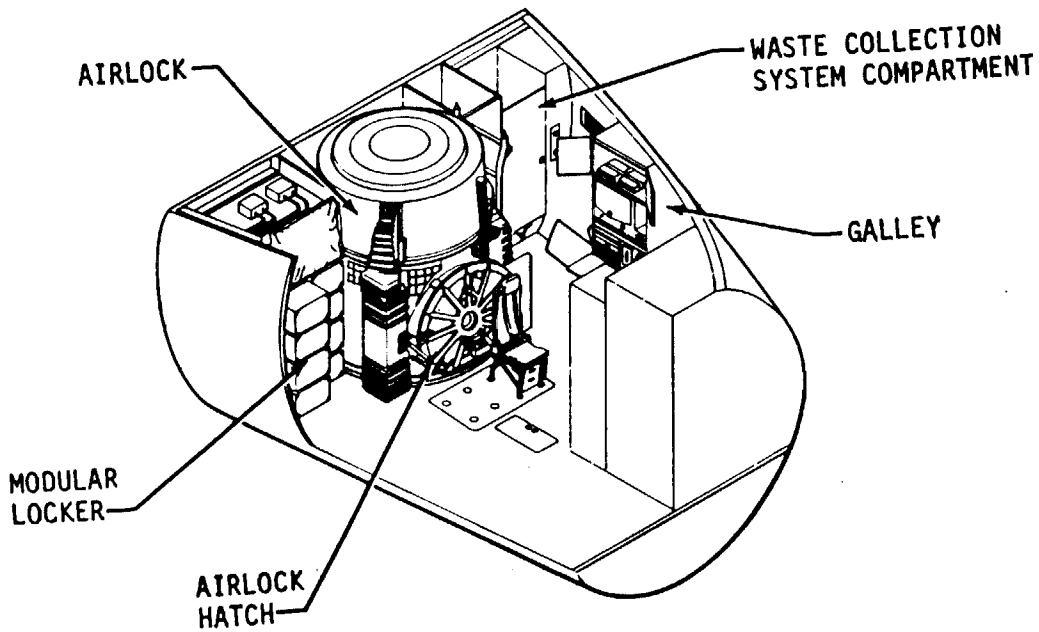


Figure 22 - General Location of Airlock Support System and Waste Collection Subsystem

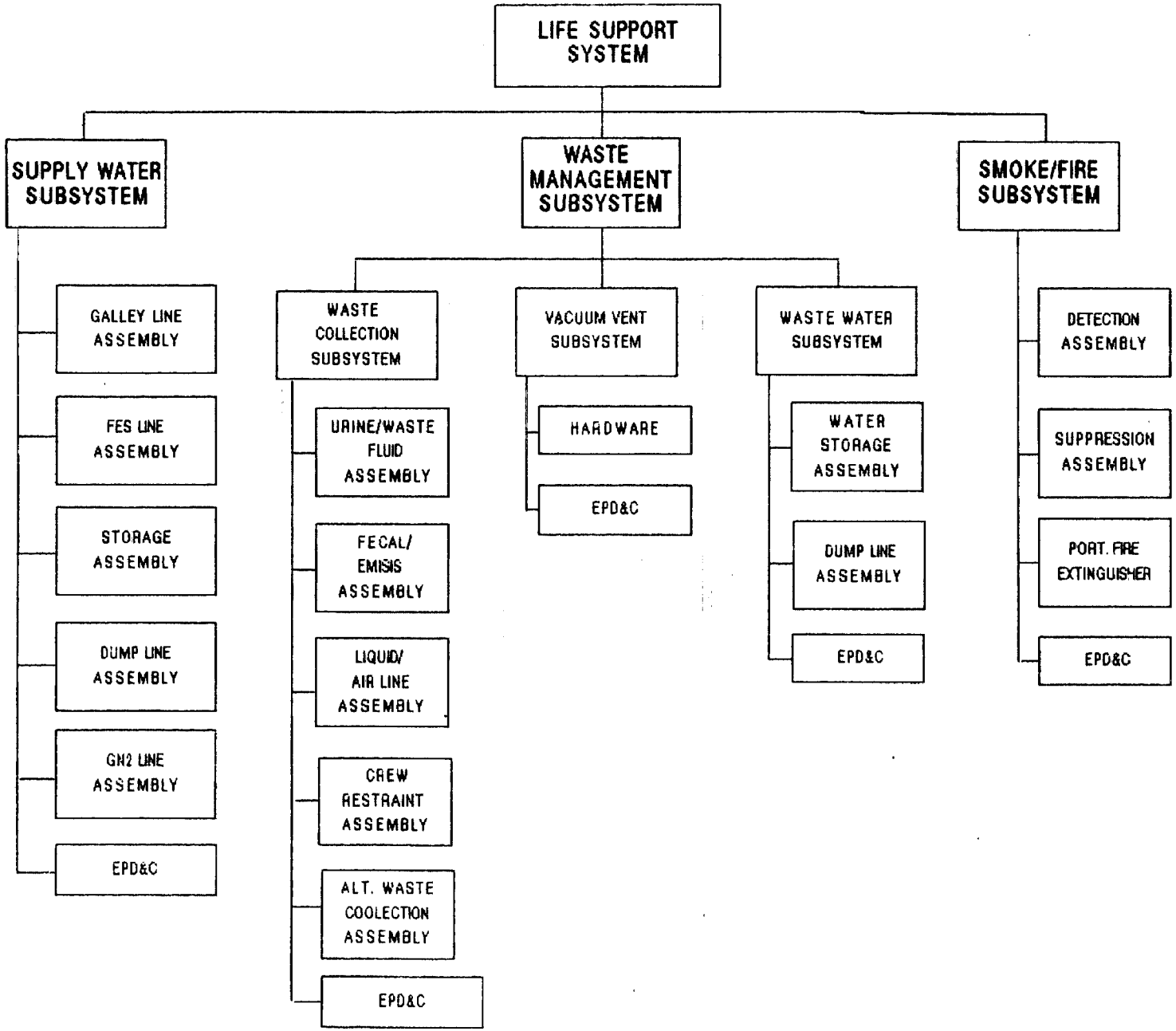


Figure 23 - Life Support System Hierarchy

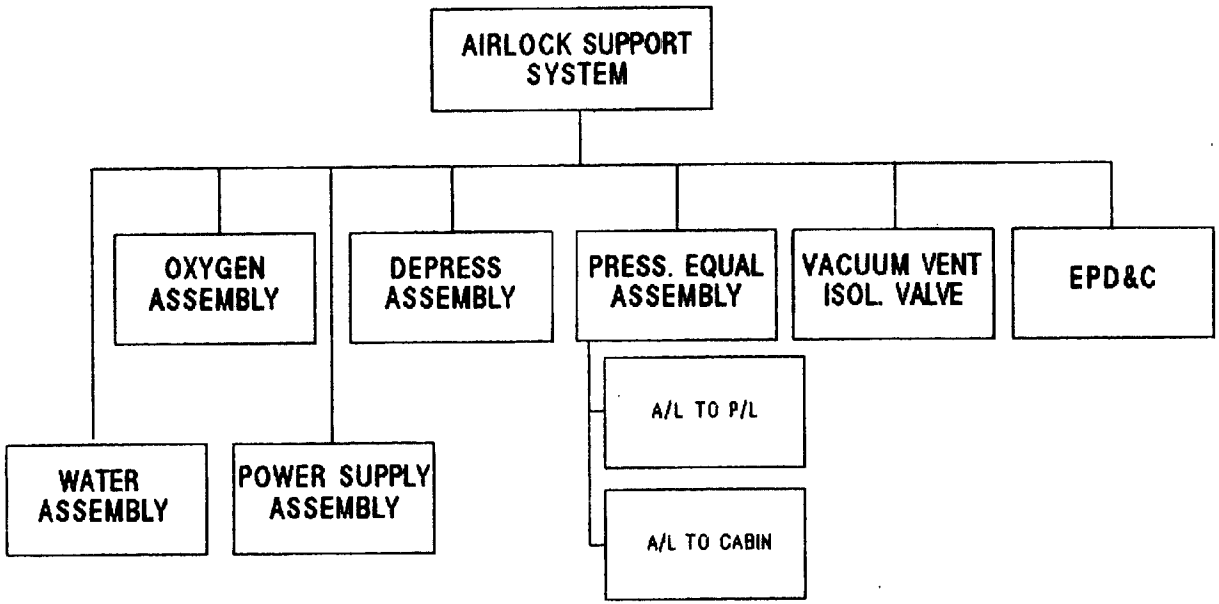


Figure 24 - Airlock Support System Hierarchy

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 LSS and ALSS. Further discussion of each of these subdivisions and the applicable failures are provided in subsequent paragraphs.

TABLE I - Summary of IOA Possible Failure Modes by Criticalities (HW/F)

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
LSS							
o SWS	-	3	36	1	40	59	139
o WMS	9	10	25	3	81	96	224
o SD/FS	8	6	6	12	-	33	65
ALSS	-	7	21	3	17	35	83
TOTAL	17	26	88	19	138	223	511

Of the 511 failures analyzed, 17 failures were determined to result in loss of crew or vehicle, and 114 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 (HW/F)

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
LSS						
o SWS	-	3	36	-	7	46
o WMS	9	10	25	-	-	44
o SD/FS	8	6	6	-	-	20
ALSS	-	7	21	2	-	30
TOTAL	17	26	88	2	7	140

The following subsections provide discussions of the indiviual subsystems with the emphasis on the potential critical items.

4.1 SWS Analysis Results - The SWS analysis incorporates all of the associated electrical and mechanical hardware items. The results for the various criticalities are presented in Table I. Of the total of 139 failure modes identified, 46 failures were found to be Potential Critical Items due to mission loss. No 1/1 criticalities were identified in this anaylsis.

The failures which precluded hydrogen separators function (separating hydrogen and water) were essentially considered to be a mission loss category. This was done since the excessive presence of hydrogen in the tanks could jeopardize the operation of FES, dump, EMU, and it may cause crew sickness. All of these were deemed necessary functions to maintain a successful mission.

Also some PCIs were due to failures which resulted in loss of providing clean filtered potable water to the crew. Under severe case, mission may be shorten if water is not available for such things as drinking, hygiene, and food preparation.

Of the remaining PCIs, several were identified to be due to failure of Redundancy Screen C. These were primarily associated with the dump line items where a severe contamination could cause blockage of the line and the redundant FES line.

Please refer to MDAC-IDs 1100 to 1238 Appendix C.1 for further definition.

4.2 WMS Analysis Results - The WMS analysis incorporates all of the associated electrical and mechanical hardware items. The results for the various criticalities are presented in Table I. Of the total of 224 failures identified, 44 failures were found to be Potential Critical Items (PCIs) due to mission loss. Further breakdown of these criticalities as explained below:

a. The Waste Collection Subsystem (WCS) analysis identified 110 failures, MDAC-ID 2001 to 2110 (Appendix C.2). Most of the failures were identified as criticality 3/2R and 3/3. Only 7 failures were identified as PCIs, and were mostly due to external leakage of waste fluids to the cabin.

b. The Waste Water Subsystem (WWS) analysis identified 96 failures, MDAC-ID 2111 to 2206 (Appendix C.2). Most of the failures were identified as criticality 3/2R and 3/3. 26 failures were identified as potential critical items, due to three major failure modes of electrical, restricted flow, and external leakage.

c. The Vacuum Vent Subsystem (VVS) analysis identified 18 failures, MDAC ID 2207 to 2224 (Appendix C.2). Nine were identified as criticality 1/1 due to external leakage of the lines and fittings, and the failure of the heaters. The remaining failures were two at 2/1R, and seven at 3/3.

4.3 Smoke Detection and Fire Suppression Analysis Results - Of the 65 failures identified, 21 failures were found to be PCIs producing mission loss. There were no 1/1 failure criticalities identified in this analysis. The majority of the failure modes were identified as 3/1R and 3/3, however none of these failures were PCIs.

Please refer to MDAC-IDs 3001 thru 3065 in Appendix C.3 for further definition.

4.4 ALSS Analysis Results - The 2/2 potential critical items were mostly due to failure modes which prevented completion of the EMU pre-EVA activities. For example, the inability to top off the EMU water tanks and purge the system of air bubbles were caused by the supply valve failure to open. Failure to deliver oxygen to a crewman was also deemed a loss of mission due to depletion of the PLSS oxygen tanks prior to an EVA. Other failure modes which were considered mission critical pertained to waste water valve failed closed, failure to depressurize the airlock, and various power losses.

Oxygen external leaks were deemed to pose a serious threat for fire, therefore they were assigned 2/1R criticalities. Other failures such as airlock pressure leak, failure of the pressure equalization valve to open to the cabin, and restricted flow failure of the filter to allow repressurization of the airlock were considered life threatening.

Two of the 3/1R electrical failures related to closing the vacuum isolation valve on demand did not pass the redundancy Screen B. These failures, will not be detectable in time to allow corrective action by the crew.

Please refer to MDAC-IDs 5001 to 5083 in Appendix C.4 for further definition.

5.0 REFERENCES

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

1. JSC-ECLSS 2102, Environmental Control and Life Support Systems Workbook, November 21, 1983.

2. JSC-19935, Environmental Systems Console Handbook, Basic Rev A, October 15, 1985.

3. RI-VS70-960102,-960103,-960104, Integrated Systems Schematics.

4. JSC-12820, STS Operational Flight Rules, Final PCN-3, June 28, 1985.

5. JSC-V61-File III, Operations Maintenance Requirements and Specification Document, February 6, 1986.

6. NSTS-22206, Instruction for Preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL), October 10, 1986 changes 1 and 2.

7. JSC-12770, Shuttle Flight Operation Manual, EVA System, Basic Rev A, Volume 15, January 6, 1984.

8. JSC-12770, Shuttle Flight Operation Manual, Crew Systems, Rev A, Volume 12, August 16, 1985.

9. JSC-2102C, Waste Collection System Workbook, November 26, 1984.

APPENDIX A
ACRONYMS

AAP	Airlock Adapter Plate
ac	Alternating Current
ACA	Annunciator Control Assembly
ALSS	Airlock Support System
AOA	Abort Once Around
AOS	Acquisition of Signal
ARPCS	Atmospheric Revitalization Pressure Control System
ARS	Atmospheric Revitalization System
ASSY	Assembly
ATCS	Active Thermal Control System
ATO	Abort to Orbit
AUX	Auxillary
AV	Avionics
CB	Circuit Breaker
CCH	Commode Control Handle
CDR	Commander
CE	Crew Equipment
CIL	Critical Items List
CL	Close
CNTL	Control
CNTRL	Control
CONT	Contingency
CRIT	Criticality
CRT	Cathode Ray Tube
CV	Check Valve
CWC	Contingency Water Container
C&W	Caution and Warning
dc	Direct Current
ECLSS	Environmental Control and Life Support System
EI	Entry Interface
EMU	Extravehicular Mobility Unit
EPD&C	Electrical Power Distribution and Control
EPS	Electrical Power Subsystem
EVA	Extravehicular Activity
F	Functional
Fan/Sep	Fan/Separator
FDA	Fault Detection Annunciation
FES	Flash Evaporator System
FLT	Flight
FMEA	Failure Modes and Effects Analysis

GFE	Government Furnished Equipment
GN2	Gaseous Nitrogen
GO2	Gaseous Oxygen
GSE	Ground Support Equipment
HTR	Heater
HW	Hardware
H2	Hydrogen
H2O	Water
IOA	Independent Orbiter Assessment
JSC	Johnson Space Center
LSS	Life Support System
LTS	Lights
LVL	Level
MDAC	McDonnell Douglas Astronautics Company
MECO	Main Engine Cut-off
MET	Mission Elapsed Time
MM	Major Mode
MMU	Manned Maneuvering Unit
NA	Not Applicable
NASA	National Aeronautics and Space Administration
NSTS	National Space Transportation System
N2	Nitrogen
OPS	Operations Sequence
PCI	Potential Critical Items
PCS	Pressure Control System
PIC	Pyrotechnic Initiator Controller
P/L	Payload
PLB	Payload Bay
PLSS	Portable Life Support Subsystem
PNL	Panel
PORT	Portable
PRSD	Power Reactant Storage and Distribution
psi	Pounds per Square Inch
psia	Pounds per Square Inch, Absolute
psid	Pounds per Square Inch, Differential
psig	Pounds per Square Inch, Gauge

QD	Quick Disconnect
QR	Quick Release
REG	Regulator
RTLS	Return To Landing Site
SCU	Service and Cooling Umbilical
SD/FS	Smoke Detection and Fire Suppression Subsystem
sec	second
SM	System Management
SOP	Secondary Oxygen Pack
STS	Space Transportation System
SW	Switch
SWS	Supply Water Subsystem
TAL	Transoceanic Abort Landing
UCD	Urine Collection Device
VAC	Volts - AC
VLV	Valve
VVS	Vacuum Vent Subsystem
WCS	Waste Collection Subsystem
WMS	Waste Management Subsystem
WWS	Waste Water Subsystem
X-DCR	Transducer
XOVR	Cross-over

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

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

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 LSS and ALSS Specific Ground Rules and Assumptions

The IOA analysis was performed to the component or assembly level of the LSS and ALSS subsystem. The analysis considered the worst case effects of the hardware or functional failure on the subsystem, mission, and crew and vehicle safety.

1. The Flash Evaporator System (topper only) was considered an unlike but redundant operation to the supply water dump operation during on-orbit phase.

   RATIONALE: Past missions have adequately demonstrated the use of FES for dumping excess water without significant impact to the mission timeline.

2. The fuel cells dedicated dump line was considered an unlike but redundant way of expelling the generated water.

   RATIONALE: The fuel cells dedicated line has not been flight tested, but the NSTS-22206 (para 2.3.2.d) considers interfacing subsystems to be operating within their specified tolerances.

3. The cross-tie capability was considered an unlike but redundant to the supply water dump line.

   RATIONALE: The use of cross-tie capability is anticipated to be under severe circumstances when no other method is available to expel the water.

4. The newly added water line from the fuel cells to Tank B was considered in this study.

   RATIONALE: This line is an approved design change and will be incorporated on all vehicles.

5. The airlock analysis assumed two crewmen for a typical EVA activity.

   RATIONALE: Rule 2-24 of the JSC-12820, STS Operational Flight Rules.

6. The airlock analysis did not consider emergency EVA to close the payload bay doors.

   RATIONALE: The payload bay door failure was considered to constitute a second failure.

7. The Apollo Fecal Bags and the Urine Collection Devices (UCD) are considered as unlike redundant hardware to the WMS.

   RATIONALE: The Apollo Fecal Bags or UCD are not employed unless the WMS is non-functional. There are adequate contingency waste collection supplies for every crew member for at least 3 days usage of the UCD and enough Apollo Fecal Bags for the mission life. If there is a generic material failure present in the contingency waste collection supplies, a mission loss would be developed at that time.

8. The Contingency Water Container (CWC) is emergency hardware and if failed requires a change in the mission schedule and loss of waste collection methods.

   RATIONALE: The CWC is not employed unless the waste water storage and dump subsystems are inoperative. There is a mission schedule impact.

9. If either the Vacuum Vent line or nozzle heater fails, a mission critical failure is assumed to have occured.

   RATIONALE: If the heaters fail, there is a potential for line or nozzle freezing and the possibility of line blockage due to ice formation. The line blockage would cause H2 contamination of the supply water due to excessive H2 pressure. There could be a life or vehicle critical condition if the hydrogen concentration in the vacuum vent dump line reaches an explosive concentration.

10. Noxious gases released into the cabin atmosphere was not considered a mission loss event.

    RATIONALE: There is a crew discomfort judgement and the effects on the crew is to be determined on a real-time basis.

11. The siren is the primary indication of a fire with FDA as a redundant indication.

    RATIONALE: The annunciator requires someone at the CDR station to know a fire exists if the siren fails. Telemetry data requires AOS.

12. The Flight Deck RT and LT sensors are parallel redundant to each other and the Cabin sensor is serial redundant to both the RT and LT sensors. The time lag in sensor triggers could be a problem.

    RATIONALE: The ECLSS ductwork where the RT, LT and Cabin sensors are located, is such that the other flight deck sensor would not be triggered until the airflow had proceeded to the middeck and back up to the flight deck. By the time the contaminated air reaches the other flight deck sensor, any incipient fire condition could be a well developed fire base, thus producing a possible loss of life condition.

13. The Test and Reset switches were not considered as emergency hardware, i.e., do not need to function during a fire situation.

    RATIONALE: The consideration is that once used after lift-off, they could create situations where redundancy was lost and therefore directly affect the emergency system.

14. Loss of fire sensor checkout capabilities was considered a condition for mission termination.

    RATIONALE: The fear of a loss of crew as a result of the safety hardware failure.

15. The portable fire-suppression bottles were not considered redundant to the AV Bay bottles during ascent or entry.

    RATIONALE: The mission event loads preclude crew motion about the cabin during these mission phases.

16. A ground rule for the SD/FS analysis was that the only failure modes for the portable fire extinguishers were premature operation or inoperative. No component level analysis was performed.

RATIONALE: The details of the portable fire extinguishers were not available at the time the analysis was performed, thus no component analysis was possible.

APPENDIX C
DETAILED ANALYSIS

This section contains the IOA analysis worksheets employed during the analysis of the Life Support system. The information on these worksheets is intentionally similar to the FMEA's written by Rockwell and the NASA. Each of these sheets identifies the 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 Rockwell Desk Instructions 100-2G. 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
- 3 = Non loss of life or vehicle or mission

Functional Criticalities :

- 1R = Redundant identical hardware components or redundant functional paths all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant identical hardware components or redundant functional paths 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
- 4 = Do Not Know

Redundancy Screens B and C :

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

C.1

SUPPLY WATER SUBSYSTEM

Analysis Worksheets

SUPPLY WATER SUBSYSTEM

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
1100 (*)	2/2	2/2		H2 SEPARATOR (2)
1101 (*)	2/2	2/2		H2 SEPARATORS (2)
1102 (*)	2/2	2/2		H2 SEPARATORS (2)
1103 (*)	2/2	2/2		H2 SEPARATORS
1104	3/2R	3/2R	P P P	MICROBIAL FILTER (1)
1105 (*)	2/2	2/2		MICROBIAL FILTER (1)
1106 (*)	2/2	2/2		MICROBIAL FILTER QD (2)
1107	3/3	/NA		MICROBIAL FILTER QD (2)
1108	3/3	3/3		TANKS INLET SOLENOID VLV (4)
1109	3/2R	3/2R	P P P	TANKS INLET SOLENOID VLV (4)
1110 (*)	2/2	2/2		TANKS INLET ISOLATION VLV (4
1111	3/2R	3/2R	P P P	TANKS OUTLET ISOLATION VLV (4)
1112	3/2R	3/2R	P P P	TANKS OUTLET ISOLATION VLV (4)
1113 (*)	2/2	2/2		TANKS OUTLET ISOLATION VLV (4)
1114	3/2R	3/2R	P P P	SWITCH, INLET ISOL VALVE (4)
1115	3/2R	3/2R	P P P	SWITCH, INLET ISOL VALVE (4)
1116	3/3	3/3		SWITCH, INLET ISOL VALVE (4)
1117	3/3	3/3		POS. IND., ISOL VLV SW (8)
1118	3/3	3/3		RESISTOR, ISOL VLV SW (8)
1119	3/3	3/3		DIODE, ISOL VALVE SWITCH (8)
1120	3/3	3/3		SOLENOID, INLET ISOL VALVE (4)
1121	3/2R	3/2R	P P P	SOLENOID, INLET ISOL VALVE (4)
1122	3/3	3/3		SOLENOID, OUTLET ISOL VALVE (4)
1123	3/2R	3/2R	P P P	SOLENOID, OUTLET ISOL VALVE (4)
1124	3/3	3/3		CB, INLET ISOL VALVE (4)
1125	3/3	3/3		CB, INLET ISOL VALVE (4)
1126	3/3	3/3		CB, OUTLET ISOL VALVE (4)
1127	3/3	3/3		CB, OUTLET ISOL VALVE (4)
1128	3/2R	3/2R	P P P	TANKS A, B, C AND D (4)
1129	3/1R	3/1R	P P P	TANKS A, B, C AND D (4)
1130	3/2R	3/2R	P P P	TANKS A, B, C AND D (4)
1131	3/2R	3/2R	P P P	SENSOR, TANKS QUANTITY (4)
1132	3/2R	3/2R	P P P	FILTER, GN2-TANKS INLET (4)
1133	3/3	3/3		FILTER, GN2-TANKS INLET (4)
1134	3/3	3/3		SENSOR, PRESSURE (1)
1135 (*)	2/2	2/2		RELIEF VALVE, 1.5 PSID (2)
1136	3/3	3/3		RELIEF VALVE, 1.5 PSID (2)
1137 (*)	2/2	2/2		RELIEF VALVE, 1.5 PSID (2)
1138	3/3	/NA		QD, GSE FILL/DRAIN (2)
1139	3/3	/NA		QD, GSE FILL/DRAIN (2)
1140	3/3	/NA		QD, GSE FILL/DRAIN (2)

(*) Potential Critical Items.

SUPPLY WATER SUBSYSTEM (cont'd)

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
1141 (*)	2/2	2/2		QD, GSE FILL/DRAIN (2)
1142	3/2R	3/2R	P P P	QD, GSE FILL/DRAIN (2)
1143	3/3	/NA		CAP, GSE QD (2)
1144	3/2R	3/2R	P P P	CAP, GSE QD (2)
1145 (*)	2/2	3/3		TANK A PRESS CNTRL VALVE (1)
1146	3/3	3/3		TANK A PRESS CNTRL VALVE (1)
1147 (*)	2/2	3/3		TANK A PRESS CNTRL VALVE (1)
1148 (*)	2/2	3/3		TANK A PRESS CNTRL VALVE (1)
1149 (*)	2/2	3/3		TANK A VENT VALVE (1)
1150	3/3	3/3		TANK A VENT VALVE (1)
1151 (*)	2/2	3/3		TANK A VENT VALVE (1)
1152	3/3	3/3		CROSSOVER VALVE (1)
1153	3/3	3/3		CROSSOVER VALVE (1)
1154 (*)	2/2	2/2		CROSSOVER VALVE (1)
1155	3/3	3/3		SOLENOID, XOVR VALVE (1)
1156	3/3	3/3		SOLENOID, XOVR VALVE (1)
1157	3/3	3/3		SWITCH, XOVR VALVE (1)
1158	3/3	3/3		SWITCH, XOVR VALVE (1)
1159	3/3	3/3		SWITCH, XOVR VALVE (1)
1160	3/3	3/3		POS. IND., XOVR VALVE (1)
1161	3/3	3/3		DIODE, XOVR VALVE (1)
1162	3/3	3/3		RESISTOR, XOVR VALVE (1)
1163	3/3	3/3		CB, XOVR VALVE (1)
1164	3/3	3/3		CB, XOVR VALVE (1)
1165	3/2R	3/2R	P P P	ISOL VALVE, FES B LINE (1)
1166	3/3	3/3		ISOL VALVE, FES B LINE (1)
1167 (*)	2/2	2/2		ISOL VALVE, FES B LINE (1)
1168	3/2R	3/2R	P P P	SOLENOID, FES ISOL VALVE (1)
1169	3/3	3/3		SOLENOID, FES ISOL VALVE (1)
1170	3/3	3/3		SWITCH, FES ISOL VALVE (1)
1171	3/3	3/3		SWITCH, FES ISOL VALVE (1)
1172	3/2R	3/2R	P P P	SWITCH, FES ISOL VALVE (1)
1173	3/3	3/3		CB, FES ISOL VALVE (1)
1174	3/3	3/3		CB, FES ISOL VALVE (1)
1175	3/3	3/3		POS. IND., FES ISOL VALVE (1)
1176	3/3	3/3		RESISTOR, FES ISOL VALVE (1)
1177	3/3	3/3		DIODE, FES ISOL VALVE (1)
1178 (*)	2/2	3/3		SUPPLY VALVE, GALLEY (1)
1179 (*)	2/2	3/3		SUPPLY VALVE, GALLEY (1)
1180 (*)	2/2	2/2		SUPPLY VALVE, GALLEY (1)
1181 (*)	2/2	3/3		SOLENOID, GALLEY VALVE (1)
1182 (*)	2/2	3/3		SOLENOID, GALLEY VALVE (1)
1183 (*)	2/2	3/3		SWITCH, GALLEY VALVE (1)
1184 (*)	2/2	3/3		SWITCH, GALLEY VALVE (1)
1185 (*)	2/2	3/3		SWITCH, GALLEY VALVE (1)

(*) Potential Critical Items.

SUPPLY WATER SUBSYSTEM (cont'd)

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
1186	3/3	3/3		POS. IND., GALLEY VALVE (1)
1187	3/3	3/3		DIODE, GALLEY VALVE (1)
1188	3/3	3/3		RESISTOR, GALLEY VALVE (1)
1189 (*)	2/2	3/3		CB, GALLEY VALVE (1)
1190	3/3	3/3		CB, GALLEY VALVE (1)
1191 (*)	3/2R	/NA	P P F	DUMP ISOL VALVE (1)
1192	3/3	/NA		DUMP ISOL VALVE (1)
1193 (*)	2/1R	3/3	P P F	DUMP ISOL VALVE (1)
1194	3/3	3/3		SOLENOID, DUMP ISOL VALVE (1)
1195	3/2R	/NA	P P P	SOLENOID, DUMP ISOL VALVE (1)
1196	3/2R	/NA	P P P	SWITCH, DUMP ISOL VALVE (1)
1197	3/2R	/NA	P P P	SWITCH, DUMP ISOL VALVE (1)
1198	3/2R	/NA	P P P	SWITCH, DUMP ISOL VALVE (1)
1199	3/3	3/3		POS. IND., DUMP ISOL VALVE (1)
1200	3/3	3/3		DIODE, DUMP ISOL VALVE (1)
1201	3/3	3/3		RESISTOR, DUMP ISOL VALVE (1)
1202	3/2R	/NA	P P P	CB, DUMP ISOL VALVE (1)
1203	3/3	3/3		CB, DUMP ISOL VALVE (1)
1204 (*)	3/2R	/NA	P P F	DUMP VALVE (1)
1205 (*)	3/2R	3/3	P P F	DUMP VALVE (1)
1206 (*)	3/2R	/NA	P P F	DUMP VALVE (1)
1207	3/2R	/NA	P P P	SOLENOID, DUMP VALVE (1)
1208	3/2R	3/3	P P P	SOLENOID, DUMP VALVE (1)
1209	3/2R	/NA	P P P	SWITCH, DUMP VALVE (1)
1210 (*)	2/1R	3/3	P F P	SWITCH, DUMP VALVE (1)
1211	3/2R	/NA	P P P	SWITCH, DUMP VALVE (1)
1212	3/2R	/NA	P P P	SWITCH, DUMP NOZZLE HEATER (1)
1213	3/2R	/NA	P P P	SWITCH, DUMP NOZZLE HEATER (1)
1214	3/3	/NA		SWITCH, DUMP NOZZLE HEATER (1)
1215	3/2R	/NA	P P P	CB, DUMP VALVE (1)
1216	3/3	/NA		CB, DUMP VALVE (1)
1217	3/3	3/3		POS. IND., DUMP VALVE (1)
1218	3/3	3/3		RESISTOR, DUMP VALVE (2)
1219	3/3	3/3		DIODE, DUMP VALVE (1)
1220	3/2R	/NA	P P P	SENSOR, NOZZLE TEMPERATURE (2)
1221 (*)	2/2	/NA		NOZZLE HEATER (1)
1222 (*)	2/2	/NA		NOZZLE HEATER (1)
1223 (*)	2/2	/NA		DUMP NOZZLE
1224	3/2R	/NA	P P P	DUMP LINE HEATER (2)
1225	3/2R	/NA	P P P	DUMP LINE HEATER (2)
1226	3/2R	/NA	P P P	THERMOSTAT, LINE HEATER (4)
1227	3/3	/NA		THERMOSTAT, DUMP LINE HTR (4)
1228 (*)	2/2	/NA		QD, CONTINGENCY CROSS-TIE (1)
1229 (*)	2/2	/NA		QD, CONTINGENCY CROSS-TIE (1)
1230	3/3	/NA		SENSOR, DUMP LINE TEMP (1)

(*) Potential Critical Items.

SUPPLY WATER SUBSYSTEM (concluded)

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
1231 (*)	3/2R	3/3	P P F	QD, ECLSS BAY (2)
1232 (*)	3/2R	3/3	P P F	QD, GALLEY/DISPENSER (2)
1233 (*)	2/2	2/2		LINES AND FITTINGS
1234 (*)	2/2	2/2		LINES AND FITTINGS
1235 (*)	2/2	2/2		LINES AND FITTINGS
1236 (*)	2/2	2/2		LINES AND FITTINGS
1237 (*)	2/1R	2/1R	P P P	WATER CHILLER (1)
1238 (*)	3/2R	/NA	P P F	WATER CHILLER (1)

(*) Potential Critical Items.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1100

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

ITEM: H2 SEPARATOR (2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62AB1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF PRIMARY WATER LINE TO THE TANKS. GENERATED WATER WILL FLOW TO TANK B THROUGH A SECONDARY LINE (NEW DESIGN) WITH NO H2 REMOVAL CAPABILITY. EXCESSIVE AMOUNT OF H2 IN THE WATER WILL CAUSE FES SHUTDOWN AND DUMP FREEZING AND THE WATER WILL NOT BE PALATABLE FOR CREW USAGE. THE MISSION SHOULD BE TERMINATED AND RETURNED ON REMAINING WATER IN THE TANK.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1101

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

ITEM: H2 SEPARATORS (2)
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62AB1

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF GENERATED WATER TO VACUUM RESULTING IN REDUCED WATER FOR FES, CREW, AND P/L. ALSO, THE FUEL CELLS WATER AND HYDROGEN LINES WILL BE EXPOSED TO VACUUM STARVING FUEL CELLS OF HYDROGEN IF THE VENT LINE IS NOT ISOLATED. ISOLATION OF THE VENT LINE WILL FORCE DUMPING OF THE FUEL CELLS WATER VIA EPS LINE, AND ABORT MISSION AND RETURN ON EXISTING WATER IN THE TANK. WASTE WATER ALSO AVAILABLE TO SUPPLEMENT SUPPLY WATER FOR FES OPERATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1102 ABORT: 2/2

ITEM: H2 SEPARATORS (2)
FAILURE MODE: INTERMITTENT OPERATION, PARTIAL OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62AB1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
REDUCED HYDROGEN REMOVAL CAPABILITY. EXCESSIVE HYDROGEN IN THE WATER LINE WILL CAUSE FREEZING DURING DUMP OPERATION AND WILL FORCE FES SHUTDOWNS. ALSO, CREW STOMACH DISCOMFORT/NAUSEA WILL BE INDUCED AS CREW CONSUMES THE WATER. TOTAL LOSS OF CAPABILITY TO DISCHARGE H2 CAN BE SERIOUS. PRESENCE OF H2 IN THE TANKS MAY NOT BE READILY DETECTABLE UNTIL FES/DUMP OPS OR CREW DRINKS IT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1103 ABORT: 2/2

ITEM: H2 SEPARATORS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62AB1

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE EXTERNAL LEAKAGE WILL EXPOSE CREW CABIN ATMOSPHERE TO VACUUM LINE THEREBY RESULTING IN CABIN DECOMPRESSION. VACUUM LINE CAN BE SHUTOFF BUT IT WOULD PLACE H2 INTO THE CABIN - FIRE HAZARD. THE FUEL CELLS SHOULD BE ISOLATED FROM THE WATER LINES GENERATED WATER DUMPED THROUGH EPS VENT, ABORT THE MISSION, AND RETURN ON EXISTING WATER IN THE TANKS. PRESENCE OF H2 IN THE CABIN IS NOT READILY DETECTABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1104 ABORT: 3/2R

ITEM: MICROBIAL FILTER (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: MID-DECK (CABIN)
PART NUMBER: 90V62BC1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
REDUCED/LOSS OF POTABLE WATER TO REPLENISH TANK A FOR DIRECT CREW USE. ADEQUATE WATER IS IN TANK A TO PROVIDE FOR CREW BUT MAY BE LIMITED FOR A FULL MISSION SCENARIO. CREW MAY USE POTABLE WATER BOTTLES (SURVIVAL KIT). ALSO WATER DISPENSER INCORPORATES AN ADDITIONAL MICROBIAL FILTER IF TANK A WATER IS USED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1105 ABORT: 2/2

ITEM: MICROBIAL FILTER (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62BC1

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF MICROBE REMOVING CAPABILITY TO PROVIDE POTABLE WATER TO THE CREW AND EXPULSION OF WATER INTO THE CABIN (MID-DECK) FLOOR. LEAK CANNOT BE ISOLATED AND MAY CAUSE ELECTRICAL SHORTS. ABORT MISSION IF LEAKAGE IS SEVERE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1106 ABORT: 2/2

ITEM: MICROBIAL FILTER QUICK DISCONNECT (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62BC1

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF MICROBE REMOVING CAPABILITY TO PROVIDE POTABLE WATER TO THE CREW AND EXPULSION OF WATER INTO THE CABIN (MID-DECK) FLOOR. LEAK CANNOT BE ISOLATED AND MAY CAUSE ELECTRICAL SHORTS. ABORT MISSION IF LEAKAGE IS SEVERE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1107 ABORT: /NA

ITEM: MICROBIAL FILTER QUICK DISCONNECT
FAILURE MODE: INABILITY TO MATE/DEMATE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62BC1

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:
THE FILTER IS INSTALLED PRELAUNCH AND REMOVED POST FLIGHT - NO MAJOR IMPACT IS SEEN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1108 ABORT: 3/3

ITEM: TANKS INLET SOLENOID VALVES (4)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV1, LV3, LV5, LV7

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOMINALLY NO PROBLEM. THE GENERATED WATER IS FLOWN THROUGH THE TANK. HOWEVER, THE CAPABILITY IS LOST TO ISOLATE A TANK FROM THE LINE IN THE EVENT THERE IS A LEAKAGE. UNDER SINGLE FAILURE CONDITION THE VALVE HAS FAILED IN ITS NOMINAL POSITION AND NO MAJOR IMPACT IS ANTICIPATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1109 ABORT: 3/2R

ITEM: TANKS INLET SOLENOID VALVE (4)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV1, LV3, LV5, LV7

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART STRUCTURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ONE TANK (UNDER SINGLE FAILURE) TO ACCEPT GENERATED WATER - SMALLER VOLUME FROM REMAINING THREE TANKS WILL FORCE MORE PERIODIC DUMPS. LOSS OF ALL REDUNDANT VALVES WILL PRECLUDE CAPABILITY FOR WATER MANAGEMENT. FUEL CELLS WATER MAY HAVE TO BE VENTED OUTSIDE AT EPS, AND ADEQUATE WATER COULD NOT BE MANAGED FOR CONTINGENCY SCENARIOS - THUS LOSS OF MISSION THAT IS ABORT AND RETURN ON EXISTING WATER AT THE TIME. THE SECONDARY WATER LINE MAY BE USED TO ACCEPT GENERATED WATER, BUT WITH NO H2 REMOVAL CAPABILITY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1110 ABORT: 2/2

ITEM: TANKS INLET ISOLATION VALVE (4)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV1, LV3, LV5, LV7

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
EXPULSION OF FUEL CELLS GENERATED WATER INTO THE ECLSS BAY. THE WATER IN THE AFFECTED TANK MAY BE DUMPED OVERBOARD AND THE TANK KEPT EMPTY IF THE LEAK IS ON THE TANK SIDE. THIS WILL REDUCE OPERATIONAL FLEXIBILITY FOR WATER MANAGEMENT. LOSS OF ONE OR MORE REDUNDANT ITEMS MAY FORCE MISSION TO RETURN WITH EXISTING WATER IN THE TANKS AND WATER LEAK INTO THE BAY. IF THE LEAKAGE IS ON THE UPSTREAM SIDE, IT CANNOT BE STOPPED WITHOUT ISOLATING FUEL CELL LINE - SPECIALLY FOR TANK A ISOL VALVE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1111 ABORT: 3/2R

ITEM: TANKS OUTLET ISOLATION VALVE (4)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV2, LV4, LV6, LV8

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO ISOLATE THE AFFECTED TANK FROM WATER LINE. DOWNSTREAM VALVES (CROSSOVER VALVE OR DUMP VALVE) MAY BE USED TO ISOLATE TANKS A, B FROM C & D. HOWEVER, WATER MANAGEMENT WILL BE MORE SEVERE AND LESS FLEXIBLE. FURTHERMORE, TANK A WATER INTEGRITY MAY NOT BE PROTECTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1112 ABORT: 3/2R

ITEM: TANKS OUTLET ISOLATION VALVE (4)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV2, LV4, LV6, LV8

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF WATER USAGE FROM THE AFFECTED TANK FORCING MORE PERIODIC DUMPS AND LESS WATER RESERVED FOR CONTINGENCY P/L BAY DOOR PROBLEM. LOSS OF FUNCTION (WATER MANAGEMENT) WILL FORCE WATER DUMPS THROUGH FUEL CELLS LINE, AND WILL FORCE FES SHUTDOWN. MISSION IS TERMINATED AND RETURNED WITHOUT FES OPS. LOSS OF FES OPERATION DURING ENTRY AND ASCENT IS NOT FULLY UNDERSTOOD WITHOUT TEST/ANALYSIS RESULTS. WASTE WATER MAY BE USED FOR FES, BUT SEVERE CONTAMINATION WILL OCCUR IN THE LINES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1113 ABORT: 2/2

ITEM: TANKS OUTLET ISOLATION VALVE (4)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV2, LV4, LV6, LV8

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
EXPULSION OF WATER INTO THE ECLSS BAY PERHAPS CREATING ELECTRICAL SHOOTS IN THE ASSOCIATED EQUIPMENT. THE AFFECTED TANK MUST BE DRAINED AND ISOLATED (SHUTOFF INLET VALVE) IF LEAKAGE IS SEVERE. FUNCTIONAL LOSS WILL PRECLUDE SUPPLY WATER FOR FES USAGE UNDER SEVERE LEAKAGE (LEAKAGE >> GENERATION). FES OPS MAY USE WASTE WATER. AN EXTERNAL LEAKAGE ON UPSTREAM SIDE CANNOT BE ISOLATED AND MAY DRAIN THE TANK CONTENT (165 LBM) INTO THE ECLSS BAY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1114 ABORT: 3/2R

ITEM: SWITCH, INLET ISOL VALVE (4)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: PNL R12A2 - CABIN
PART NUMBER: S3, 9, 14 AND 6

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
THIS FAILURE MODE (PHYSICALLY JAMMED IN CLOSED POSITION) WILL PREVENT OPENING OF THE INLET ISOL VALVE TO ALLOW FLOW OF WATER TO THE AFFECTED TANK - THAT IS LOSS OF ONE TANK FROM WATER MANAGEMENT SCENARIO. FUNCTIONAL LOSS OF REDUNDANT ITEMS WILL HAVE SAME EFFECTS AS MDAC-1109.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1115 ABORT: 3/2R

ITEM: SWITCH, INLET ISOL VALVE (4)
FAILURE MODE: SHORTED, SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: PNL R12A2 - CABIN
PART NUMBER: S3, 9, 14 AND 6

CAUSES: CONTAMINATION, CORROSION

EFFECTS/RATIONALE:
A SHORT ACROSS "CLOSE" CONTACTS IS PERCEIVED TO BE MORE SEVERE THAN ACROSS "OPEN" CONTACTS. IN THIS CASE, THE AFFECTED TANK WILL BE ISOLATED FROM GENERATED WATER LINE AND THE EFFECT IS SAME AS EXPLAINED FOR INLET VALVE FAILED CLOSED, MDAC-1109.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1116 ABORT: 3/3

ITEM: SWITCH, INLET ISOL VALVE (4)
FAILURE MODE: OPEN (ELECTRICAL), SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2 - CABIN
PART NUMBER: S3, 9, 14 AND 6

CAUSES: CONTAMINATION, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
A SINGLE CONTACT OPEN ACROSS "OPEN" PINS WILL PREVENT OPENING OF THE ISOL VALVE THEREFORE ISOLATING THE AFFECTED TANK FROM GENERATED WATER LINE - SEE MDAC-1109. HOWEVER, THE VALVES ARE ALL CONFIGURED TO OPEN POSITION THROUGHOUT MISSION, AND NO CREW ACTION IS ANTICIPATED TO CLOSE THEM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1117 ABORT: 3/3

ITEM: POSITION INDICATION, ISOL VALVE SWITCH (8)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2 - CABIN
PART NUMBER: DS1, 2, 5, 2*6, 7, 9, 10

CAUSES: PIECE-PART STRUCTURE

EFFECTS/RATIONALE:
LOSS OF BARBER POLE VALVE POSITION INDICATION IS INSIGNIFICANT SINCE THE VALVE POSITION CAN BE VERIFIED BY CHANGE OF WATER IN THE TANK AND TELEMETRY DATA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1118 ABORT: 3/3

ITEM: RESISTOR, ISOL VALVE SWITCH (8)
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2 - CABIN
PART NUMBER: A3R1/42, A6R1/R2, A9R1/R2, A4R1/R2

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
OPEN RESISTOR WILL RESULT IN LOSS OF VALVE POSITION INDICATION TO THE MDM OTHERWISE NO MAJOR IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1119 ABORT: 3/3

ITEM: DIODE, ISOL VALVE SWITCH (8)
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2 - CABIN
PART NUMBER: A10CR1/CR2, A10CR6/CR7, A10CR9/CR10, A5CR1/CR2

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
OPEN DIODE WILL RESULT IN LOSS OF ISOL VALVE POSITION INDICATION ON THE BARBER POLE, OTHERWISE NO MAJOR IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1120 ABORT: 3/3

ITEM: SOLENOID, INLET ISOL VALVE (4)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO START/STOP

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV1, 3, 5 & 7

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPERATE THE AFFECTED VALVE - THE VALVE REMAINS IN ITS EXISTING POSITION. THE WORST CASE IS CONSIDERED FOR WANTING TO CLOSE THE VALVE (VALVE IS CONFIGURED OPEN THROUGHOUT MISSION) IN ORDER TO ISOLATE THE TANK. HOWEVER, THIS SCENARIO WOULD BE OFF-NOMINAL AND UNDER MULTIPLE CONDITION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1121 ABORT: 3/2R

ITEM: SOLENOID, INLET ISOL VALVE (4)
FAILURE MODE: FAILS TO REMAIN OPEN, SHORTED LATCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV1, 3, 5, 7

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE VALVE, THUS THE AFFECTING TANK WILL BE ISOLATED FROM THE GENERATED WATER LINE RESTRICTING FLEXIBILITY IN WATER MANAGEMENT. SAME EFFECT AS THE VALVE FAILED TO OPEN - MDAC-1109. THE FAILURE MAY NOT BE READILY APPARENT TO BE DUE TO SOLENOID FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1122 ABORT: 3/3

ITEM: SOLENOID, OUTLET ISOL VALVE (4)
FAILURE MODE: FAILS TO REMAIN CLOSED, OPEN (ELECTRICAL), FAILS TO START/STOP

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV2, 4, 6, 8

CAUSES: CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
NO MAJOR EFFECT SINCE ALL THE VALVES REMAIN OPEN (NOMINAL CONFIGURATION) EXCEPT FOR TANK A. TANK A WOULD REMAIN CLOSED THROUGHOUT MISSION, BUT COULD NOT BE USED FOR ADDITIONAL WATER REQUIREMENT TO SUSTAIN NOMINAL MISSION. THE LATCH FAILURE MAY NOT BE READILY APPARENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1123 ABORT: 3/2R

ITEM: SOLENOID, OUTLET ISOL VALVE (4)
FAILURE MODE: FAILS TO REMAIN OPEN, SHORTED LATCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV2, 4, 6, 8

CAUSES: CONTAMINATION, CORROSION

EFFECTS/RATIONALE:
THIS FAILURE WILL FORCE THE VALVE TO CLOSE THEREBY PRECLUDING THE TANK FOR FES/DUMP OPS AND RESERVE REQUIREMENT. THE EFFECT WILL BE SAME AS ISOL VALVE FAILED CLOSED, MDAC-1112. THE FAILURE MAY NOT BE READILY APPARENT TO BE DUE TO SOLENOID.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1124 ABORT: 3/3

ITEM: CB, INLET ISOL VALVE (4)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO OPEN, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB1, 5, 7, 12

CAUSES: CONTAMINATION, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER TO OPERATE THE INLET ISOL VALVES. HOWEVER, NO MAJOR IMPACT SINCE THE VALVE REMAIN IN THEIR OPERATING POSITIONS. WITH A SUBSEQUENT FAILURE, THE TANK(S) COULD NOT BE ISOLATED FROM LINE - MULTIPLE FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1125 ABORT: 3/3

ITEM: CB, INLET ISOL VALVE (4)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB1, 5, 7, 12

CAUSES: CONTAMINATION, CORROSION

EFFECTS/RATIONALE:
NO MAJOR PROBLEM, EXCEPT FOR LOSS OF OVERLOAD CIRCUIT PROTECTION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1126 ABORT: 3/3

ITEM: CB, OUTLET ISOL VALVE (4)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB2, 3, 6, 11

CAUSES:

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO RE-CONFIGURE THE VALVES. HOWEVER, NO MAJOR PROBLEM SINCE THE VALVES REMAIN IN THEIR NOMINAL OPERATING POSITION, EXCEPT THAT TANK A WATER WOULD NO LONGER BE AVAILABLE IF NEEDED. WATER MANAGEMENT IS DO-ABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1127 ABORT: 3/3

ITEM: CB, OUTLET ISOL VALVE (4)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN, SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO MAJOR IMPACT EXCEPT FOR LOSS OF OVERLOAD CIRCUIT PROTECTION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1128 ABORT: 3/2R

ITEM: TANKS A, B, C AND D (4)
FAILURE MODE: INTERNAL LEAKAGE, RUPTURE BLADDER

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62TK1, 2, 3 AND 4

CAUSES: OVERLOAD, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
THE RUPTURE OF BLADDER WILL RESULT IN HIGH PRESSURE NITROGEN TO MIX AND FLOW DOWN THE WATER LINE TO FES/DUMP NOZZLE, CAUSING POSSIBLE SHUTDOWN OF FES AND ICING OF THE DUMP NOZZLE UPON DUMP. ALSO THE NITROGEN WILL BE CONSUMED VERY RAPIDLY. THE TANK SHOULD BE ISOLATED FROM THE LINE WHICH MAKES THE WATER MANAGEMENT MORE STRINGENT. LOSS OF FUNCTION WILL FORCE DUMPING OF GENERATED WATER THROUGH THE FUEL CELLS DEDICATED VENT LINE AND RETURN WITH FES ON WASTE WATER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	6/25/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/1R
MDAC ID:	1129	ABORT:	3/1R

ITEM: TANKS A, B, C AND D (4)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62TK1, 2, 3 AND 4

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
AN EXTERNAL LEAK OF GN2 INTO THE CABIN WILL RAISE THE PPN2 IN THE CABIN, FORCING CABIN POSITIVE RELIEF VALVE TO CONTINUOUSLY VENT CABIN ATMOSPHERE. THE TANK MUST BE ISOLATED FROM THE LINE, THUS NEGATING ITS USE FOR WATER MANAGEMENT. LOSS OF FUNCTION MAY REQUIRE WASTE WATER CROSS-TIE TO SUPPORT FES UPON ENTRY. LOSS OF FUNCTION WITHOUT CREW ACTION WILL DEPLETE GN2 SUPPLY REQUIRED FOR CABIN PRESSURE MAINTENANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1130 ABORT: 3/2R

ITEM: TANKS A, B, C AND D (4)
FAILURE MODE: PHYSICAL BINDING/JAMMING OF THE BELLOWS

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) ERROR
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF PRESSURE TO EXPEL WATER TO FES AND DUMP LINES. LOSS OF FUNCTION (PRESSURIZATION) IN ALL TANKS MAY FORCE WASTE WATER CROSS-TIE IN ORDER TO MANAGE SUPPLY WATER GENERATION THROUGH WASTE TANK.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1131 ABORT: 3/2R

ITEM: SENSOR, TANKS QUANTITY (4)
FAILURE MODE: FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: V62Q0410A, 420A, 548A, 544A

CAUSES: CONTAMINATION, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF A SINGLE TRANSDUCER IS NOT SIGNIFICANT. THE WATER QUANTITY CAN BE ESTIMATED BY WATER GENERATION MINUS USAGE. HOWEVER, LOSS OF FUNCTION (NO WATER MEASUREMENT) MAY CAUSE OVER FILLING OF THE TANKS, AND FLOODING OF THE FUEL CELLS - NOMINAL DUMP SCHEDULES BUILT INTO THE FLIGHT PROCEDURE SHOULD PRECLUDE THIS. PRECISE WATER REQUIREMENT/RESERVES MAY NOT BE MET.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1132 ABORT: 3/2R

ITEM: FILTER, GN2-TANKS INLET (4)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62FL1, FL2, FL4, FL5

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF PRESSURIZATION TO EXPEL WATER FOR FES, DUMP, AND CREW USAGE. A SINGLE FAILURE WILL HAVE MINOR PROBLEM FOR TANK A ONLY - WATER MAY NOT FLOW EASILY. LOSS OF FUNCTION (EXPULSION OF WATER) MAY REQUIRE CROSS-TIE TO SUPPORT FES FROM WASTE TANK AND RETURN. FAILURE MAY BE DETECTED BY NO CHANGE IN THE TANK QUANTITY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1133 ABORT: 3/3

ITEM: FILTER, GN2-TANKS INLET (4)
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62FL1, FL2, FL4, FL5

CAUSES: STRUCTURAL FAILURE

EFFECTS/RATIONALE:
UNDER A SINGLE FAILURE, THERE IS NO MAJOR IMPACT. HOWEVER, WITH A SUBSEQUENT BLADDER RUPTURE WATER WILL FLOW INTO THE CABIN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1134 ABORT: 3/3

ITEM: SENSOR, PRESSURE (1)
FAILURE MODE: FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: OUTLET OF MICROBIAL FILTER
PART NUMBER: V62P0430A

CAUSES: MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF WATER LINE PRESSURE INDICATION. NO IMPACT SINCE THE SENSOR IS NOT TERRIBLY IMPORTANT - TANK QUANTITY READINGS WILL PROVIDE ADEQUATE SUPPORT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	7/09/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	2/2
MDAC ID:	1135	ABORT:	2/2

ITEM: RELIEF VALVE, 1.5 PSID (2)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62RV1 AND RV2

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
THE FAILURE OF EITHER VALVE WILL PRECLUDE THE PRIMARY WATER LINE. THE WATER FROM FUEL CELLS WILL BE FLOWN TO THE TANKS THROUGH THE NEWLY DESIGNED SECONDARY BUT WITH NO HYDROGEN REMOVAL CAPABILITY. THE FAILURE OF FIRST VALVE WILL ISOLATE TANKS B, C, AND D FROM THE LINE, AND THE FAILURE OF THE SECOND VALVE WILL ISOLATE TANKS C & D. AT ANY RATE, THERE WILL BE LESS STORAGE CAPABILITY FOR WATER MANAGEMENT/RESERVE.

REFERENCES:

C-2

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1136

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

ITEM: RELIEF VALVE, 1.5 PSID (2)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62RV1 AND RV2

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO MAJOR IMPACT, EXCEPT THAT THE BACK FLOW OF WATER CANNOT BE STOPPED WITH A SUBSEQUENT FAILURE (DOUBLE FAILURE).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1137 ABORT: 2/2

ITEM: RELIEF VALVE, 1.5 PSID (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62RV1 AND RV2

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
THIS FAILURE WILL RESULT IN CONTINUOUS FLOW OF WATER INTO THE ECLSS BAY, AND POSSIBLY CAUSING CORROSION AND ELECTRICAL SHORTS. THE EXTERNAL LEAKAGE CANNOT BE STOPPED WITHOUT SHUTTING DOWN THE FUEL CELLS. MISSION IS ABORTED AND RETURNED WITH EXISTING WATER IN THE TANKS AND EXTERNAL LEAKAGE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1138 ABORT: /NA

ITEM: QD, GSE FILL/DRAIN (2)
FAILURE MODE: INABILITY TO MATE/DEMATE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FWD FUSELAGE
PART NUMBER: 90V62TP80, 80V62TP85

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
THIS FAILURE WILL ONLY AFFECT THE PRELAUNCH/POSTLANDING OPERATION AND NOT APPLICABLE TO FLIGHT. NO SIGNIFICANT PROBLEM IS ANTICIPATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1139

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

ITEM: QD, GSE FILL/DRAIN (2)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FWD FUSELAGE
PART NUMBER: 90V62TP80, 80V62TP85

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF RECHARGE/SERVICING ACTIVITIES - THE UNIT MAY BE REPLACED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1140 ABORT: /NA

ITEM: QD, GSE FILL/DRAIN (2)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FWD FUSELAGE
PART NUMBER: 90V62TP80, 80V62TP85

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF RECHARGE/SERVICING OF THE TANKS - THE UNIT MAY BE REPLACED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1141 ABORT: 2/2

ITEM: QD, GSE FILL/DRAIN (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FWD FUSELAGE
PART NUMBER: 90V62TP80, 80V62TP85

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
THE LEAKAGE FROM THE FILL DRAIN (ON THE UPSTREAM SIDE) CANNOT BE STOPPED, AND IF SEVERE, IT WILL PREVENT THE TANKS FROM BEING REPLENISHED - LIMITED WATER MANAGEMENT, AND POSSIBLE ICING ON THE SIDE OF THE VEHICLE. THE LEAKAGE WITH THE DRAIN DISCONNECT CAN BE STOPPED BY ISOLATING TANKS C AND D. HOWEVER, WATER MANAGEMENT BECOMES TOO STRINGENT AND LESS FLEXIBLE. ALSO NOT ENOUGH RESERVE FOR CERTAIN REQUIREMENTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1142 ABORT: 3/2R

ITEM: QD, GSE FILL/DRAIN (2)
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: FWD FUSELAGE
PART NUMBER: 90V62TP80, 80V62TP85

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
AN INTERNAL LEAKAGE THROUGH THE QD WILL HAVE NO EFFECT SINCE THE CAP PROVIDES A REDUNDANT SEAL. HOWEVER, WITH SUBSEQUENT FAILURE OF THE CAP, THE WATER LEAKAGE CANNOT BE STOPPED FROM THE FILL LINE CAUSING ICING AND LOSS OF WATER MANAGEMENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1143 ABORT: /NA

ITEM: CAP, GSE QD (2)
FAILURE MODE: INABILITY TO MATE/DEMATE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FWD FUSELAGE
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
THE CAP MAY BE REPLACED, AND THE FAILURE IS NOT APPLICABLE AFTER LIFT OFF.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1144 ABORT: 3/2R

ITEM: CAP, GSE QD (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: FWD FUSELAGE
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:
THE GSE DISCONNECTS ARE SELF-SEALING DISCONNECTS WHICH PREVENT ANY INTERNAL LEAKAGE. UNDER SINGLE FAILURE, THERE WILL BE NO SIGNIFICANT IMPACT. HOWEVER, WITH A SUBSEQUENT FAILURE OF THE QD, THE LEAKAGE CANNOT BE STOPPED AND THE FUEL CELLS WATER WILL CONTINUOUSLY DRAIN OUT CAUSING POSSIBLE ICING AND LOSS OF WATER MANAGEMENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1145 ABORT: 3/3

ITEM: TANK A PRESSURE CONTROL VALVE (1)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GN2 LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: PNL-ML26C

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF PRESSURIZATION ON TANK. MINIMUM IMPACT DURING ASCENT (NOMINALLY CLOSED) AND ENTRY (WATER AVAILABLE FROM B, C, AND D). ON-ORBIT POTABLE WATER WILL NOT BE AVAILABLE FROM TANK A. WATER FLOW VERY SLOW AND IF NOT ADEQUATE FOR CREW USE WILL HAVE MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1146 ABORT: 3/3

ITEM: TANK A PRESSURE CONTROL VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INADVERTENT OPERATION/OPEN, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GN2 LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: PNL-ML26C

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
TANK A WILL BE PRESSURIZED DURING ASCENT WHICH MAY CAUSE WATER BACK PRESSURE TO RISE AND ALLOWS THE GENERATED WATER TO FILL TANK B DIRECTLY (SECONDARY PATH). TANK B IS GENERALLY FULL AND SUPPORT FES DURING ASCENT WILL RATE OF USE MUCH GREATER THAN GENERATION. THEREFORE, NO SIGNIFICANT PROBLEM WILL BE ANTICIPATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1147 ABORT: 3/3

ITEM: TANK A PRESSURE CONTROL VALVE (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GN2 LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: PNL-ML26C

CAUSES: CONTAMINATION, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO PRESSURIZE TANK A, RESULTING IN PARTIAL LOSS OF WATER FOR CREW USE. WATER IS STILL AVAILABLE FROM DISPENSER, BUT AT A VERY LOW SPEED - IT MAY NOT BE ADEQUATE FOR HIGH DEMAND. CREW INCONVENIENCE MAY NECESSITATE MAJOR CHANGES IN THE ORIGINAL MISSION PROFILE - REAL TIME CALL. ALSO, ONE TANK LESS IN THE OVERALL WATER MANAGEMENT, THUS MORE STRINGENT AND COMPLICATED WATER MANAGEMENT, RESULTING IN MORE FREQUENT DUMPS OR FES OPS, AND NOT ADEQUATE RESERVE FOR CERTAIN SCENARIOS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1148 ABORT: 3/3

ITEM: TANK A PRESSURE CONTROL VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GN2 LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: PNL-ML26C

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
CONTINUOUS FLOW OF NITROGEN INTO CABIN COMPLICATING CABIN PRESSURE CONTROL SYSTEM. A LEAK UPSTREAM OF THE VALVE CANNOT BE ISOLATED WITHOUT TOTAL ISOLATION OF ALL TANKS FROM GN2 PRESSURIZATION - CABIN WILL BE AVAILABLE AS BACK-UP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1149 ABORT: 3/3

ITEM: TANK A VENT VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GN2 LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: PNL-ML26C

CAUSES: MECHANICAL SHOCK, PIECE-PART STRUCTURE, VIBRATION

EFFECTS/RATIONALE:
TANK A CANNOT BE PRESSURIZED FROM GN2 LINE. LOSS OF TANK A FROM OVERALL WATER MANAGEMENT. CABIN PRESSURE MAY BE USED TO EXPEL WATER FROM ALL TANKS. LOSS OF ONE TANK FROM PRIMARY WATER MANAGEMENT, THUS LESS RESERVE FOR CERTAIN MISSION REQUIREMENTS. WATER FLOW FROM THE TANK WILL BE SEVERELY DIMINISHED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1150 ABORT: 3/3

ITEM: TANK A VENT VALVE (1)
FAILURE MODE: FAILS TO OPEN, PHYSICAL BINDING/JAMMING, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GN2 LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: PNL-ML26C

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
THE VALVE IS USED PRELAUNCH TO VENT TANK A PRESURE TO CABIN. UNDER NOMINAL AND SINGLE FAILURE, NO EFFECT IS ANTICIPATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1151 ABORT: 3/3

ITEM: TANK A VENT VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GN2 LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: PNL-ML26C

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNREGULATED FLOW OF NITROGEN INTO THE CABIN AFTER THE TANK IS PRESSURIZED. COMPLICATING CABIN PRESSURE CONTROL SYSTEM TANK SHOULD BE ISOLATED THUS RESULTING IN LOSS A TANK FROM WATER MANAGEMENT SCHEME AND POSSIBLE MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1152

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

ITEM: CROSSOVER VALVE (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV13

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

EFFECTS/RATIONALE:
NO SIGNIFICANT PROBLEM EXCEPT THAT WATER FROM FOUR TANKS WILL NOT BE AVAILABLE AT THE SAME TIME. WITH SINGLE FAILURE OF THIS VALVE ONLY, THE WATER MANAGEMENT AND FES/DUMP OPS ARE DOABLE. TWO TANKS RESERVE IS ADEQUATE FOR NOMINAL ENTRY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1153 ABORT: 3/3

ITEM: CROSSOVER VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV13

CAUSES: MECHANICAL SHOCK, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
DIRECT CAPABILITY IS LOST TO ISOLATE TANK A AND B FROM TANKS C AND D. THIS MAY BE ACCOMPLISHED THROUGH TANKS OUTLET VALVES AND THE FES LINE B ISOL VALVE. HOWEVER, WITH A SUBSEQUENT FAILURE SUCH AS EXTERNAL LEAKAGE ON FES LINE A, THE LEAK CANNOT BE ISOLATED WITHOUT ISOLATING ALL TANKS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1154 ABORT: 2/2

ITEM: CROSSOVER VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV13

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
AN EXTERNAL LEAKAGE IF SEVERE AND NOT STOPPABLE BY THE VALVE WILL FORCE SHUTTING DOWN THE TANKS OUTLET VALVES IN ORDER TO ISOLATE THE LEAK. THIS IN ESSENCE WILL PRECLUDE FES/DUMP OPS. GENERATED WATER TO BE VENTED ABOARD THROUGH FUEL CELLS LINE AND ABORT WITHOUT FES (POSSIBLY).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1155 ABORT: 3/3

ITEM: SOLENOID, XOVR VALVE (1)
FAILURE MODE: FAILS TO CLOSE, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV13

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THE CROSSOVER VALVE WILL REMAIN OPEN - SEE MDAC-1153.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1156 ABORT: 3/3

ITEM: SOLENOID, XOVR VALVE (1)
FAILURE MODE: FAILS TO OPEN, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV13

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
UPON ACTIVATION OF THIS SWITCH AND THE FAILURE, POWER WILL BE APPLIED TO BOTH SIDES OF THE SOLENOID RESULTING IN POPPING THE CIRCUIT BREAKER AND/OR BURNING OF THE SOLENOID. VALVE RECONFIGURATION WILL BE LOST. HOWEVER, UNDER SINGLE FAILURE SCENARIO NO SIGNIFICANT IMPACT IS ANTICIPATED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1157 ABORT: 3/3

ITEM: SWITCH, XOVR VALVE (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING, FAILS TO SWITCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S5

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF SWITCH ACTION TO RECONFIGURE THE XOVR VALVE. THE VALVE IS SET CLOSED PRELAUNCH AND WILL REMAIN CLOSED THROUGHOUT THE MISSION - SEE MDAC-1152. ANY SINGLE POSITION FOR BINDING/JAMMING WILL HAVE NO SIGNIFICANT IMPACT (VALVE EITHER OPEN OR CLOSED).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1158 ABORT: 3/3

ITEM: SWITCH, XOVR VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL), ANY SINGLE CONTACT, FAILS TO SWITCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV13

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THIS FAILURE CAUSES THE CROSSOVER VALVE TO REMAIN OPEN - SEE MDAC-1153.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1159 ABORT: 3/3

ITEM: SWITCH, XOVR VALVE (1)
FAILURE MODE: SHORTED, ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV13

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
CONTINUOUS POWER IS APPLIED TO THE SOLENOID CAUSING IT TO FAIL (BURN OUT) OR POP THE CIRCUIT BREAKER. ALSO, IF A SHORT OCCURS AND THE SWITCH IS ACTIVATED THE POWER MAY BE APPLIED TO BOTH SIDES OF THE SOLENOID, BURNING THE SOLENOID. AT EITHER CASE, THE ABILITY TO RECONFIGURE THE VALVE IS LOST AND THE WORST CASE IS THE LOSS OF ABILITY TO OPEN THE VALVE - SEE MDAC-1152.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1160 ABORT: 3/3

ITEM: POSITION INDICATION, XOVR VALVE (1)
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL 412A2
PART NUMBER: DS3

CAUSES: MECHANICAL SHOCK, LOSS OF INPUT, VIBRATION

EFFECTS/RATIONALE:
THE POSITION OF THE VALVE MAY BE DETECTED BY THE EFFECT OF WATER FLOW THROUGH THE LINE OR TELEMETRY DATA ON MDM-OF4.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1161

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

ITEM: DIODE, XOVR VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL 412A2
PART NUMBER: A10CR3

CAUSES: MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF THE CROSSOVER VALVE POSITION INDICATION ON THE BARBER POLE. NO SIGNIFICANT EFFECT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1162 ABORT: 3/3

ITEM: RESISTOR, XOVR VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL 412A2
PART NUMBER: A17R1

CAUSES: MECHANICAL SHOCK, TEMPERATURE, THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF VALVE POSITION INDICATION TO MDM-OF4. NO SIGNIFICANT IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1163 ABORT: 3/3

ITEM: CB, XOVR VALVE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: CB14

CAUSES: PIECE-PART FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF POWER TO RE-CONFIGURE THE XOVR VALVE. THE VALVE WILL REMAIN IN ITS POSITION BEFORE THE FAILURE - SEE MDAC-1152 AND 1153.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1164 ABORT: 3/3

ITEM: CB, XOVR VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) TANK ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF CIRCUIT PROTECTION WITH OVER VOLTAGE/CURRENT, OTHERWISE NO MAJOR IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1165 ABORT: 3/2R

ITEM: ISOL VALVE, FES B LINE (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV12

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ONE LEG OF REDUNDANCY TO PROVIDE WATER TO THE FES. LINE A IS AVAILABLE TO SUPPORT FES. FUNCTIONAL LOSS (NO WATER TO FES) IS CONSIDERED MISSION IMPACT ONLY. HOWEVER, IN ORDER TO HAVE A FUNCTIONAL LOSS, THE TANKS A AND B OUTLET VALVES AND CROSSOVER VALVE SHOULD HAVE FAILED CLOSED (MULTIPLE FAILURE). OTHER FAILURES WHICH MAY PRECLUDE USE OF LINE A ARE IN THE ATCS (FES) ANALYSIS AND MUST BE CONSIDERED OPERATIONALLY SOUND. THERE IS NO DIRECT REDUNDANCY FOR THIS VALVE. THE FAILURE LEAVES FES WITH ONE FEED WATER LINE. VALVE IS NOMINALLY CONFIGURED CLOSED AND RECONFIGURED ON-ORBIT FOR LINE B REDUNDANCY CHECKOUTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1166 ABORT: 3/3

ITEM: ISOL VALVE, FES B LINE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV12

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO ISOLATE FES FEEDLINE B IN CASE OF A LEAKAGE DOWNSTREAM, OTHERWISE CONTINUE TO OPERATE ON LINE B. XOVER VALVE AND TANKS C/D OUTLET VALVES MAY BE USED TO ISOLATE THE FEEDLINE. FES, ALSO HAS DEDICATED ISOL VALVE TO COMPENSATE FOR THE LOSS. NOMINAL CONFIGURATION OF THE VALVE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1167 ABORT: 2/2

ITEM: ISOL VALVE, FES B LINE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV12

CAUSES:

EFFECTS/RATIONALE:
EXPULSION OF WATER INTO THE ECLSS BAY. THE LINE MUST BE ISOLATED VIA XOVR VALVE AND TANKS C/D OUTLET VALVES. REDUCED FLEXIBILITY IN WATER MANAGEMENT, AND LOSS OF ONE LEG OF REDUNDANT FEEDWATER LINE TO FES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1168 ABORT: 3/2R

ITEM: SOLENOID, FES ISOL VALVE (1)
FAILURE MODE: FAILS TO OPEN, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV12

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
IN THIS CASE THE VALVE REMAINS CLOSED - SEE MDAC-1165. THE EFFECT OF THE FAILURE IS DETECTABLE, BUT IT COULD NOT BE DETECTED TO BE DUE TO SOLENOID.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1169 ABORT: 3/3

ITEM: SOLENOID, FES ISOL VALVE (1)
FAILURE MODE: FAILS TO CLOSE, OPEN (ELECTRICAL, SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV12

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THE VALVE REMAINS OPEN - SEE MDAC-1166.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1170 ABORT: 3/3

ITEM: SWITCH, FES ISOL VALVE (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: S16

CAUSES: CONTAMINATION, CORROSION

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO ACTIVATE THE FES ISOL VALVE. THE VALVE IS CONFIGURED OPEN THROUGHOUT THE MISSION AND NO FURTHER ACTION IS REQUIRED. THUS THE VALVE WILL REMAIN OPEN - SEE MDAC-1166.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1171 ABORT: 3/3

ITEM: SWITCH, FES ISOL VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL), ANY SINGLE FAILURE, FAILS TO SWITCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S16

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF SWITCHING CAPABILITY TO ACTIVATE THE VALVE. THE VALVE REMAINS OPEN (NOMINALLY SETTING) - SEE MDAC-1166.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1172 ABORT: 3/2R

ITEM: SWITCH, FES ISOL VALVE (1)
FAILURE MODE: SHORTED, ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

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 [2] B [P] C [P]

LOCATION: PNL R12A2
PART NUMBER: S16

CAUSES:

EFFECTS/RATIONALE:
CONTINUOUS POWER APPLIED TO THE SOLENOID WHICH MAY CAUSE IT TO BURN OUT. ALSO, UPON ACTIVATION OF SWITCH ON THE OPPOSITE CONTACT, POWER WILL BE APPLIED TO BOTH SIDES OF THE SOLENOID RESULTING IN LOSS OF SOLENOID AND POTENTIAL FOR FIRE (IF CB DOES NOT POP). THE WORST CASE IS THE FAILURE WHICH CAUSES THE VALVE TO REMAIN CLOSED - LOSS OF FES FEEDWATER LINE B - SEE MDAC-1165.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1173 ABORT: 3/3

ITEM: CB, FES ISOL VALVE (1)
FAILURE MODE: RAILS TO REMAIN CLOSED, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB9

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER TO ACTIVATE THE ISOL VALVE - VALVE WILL REMAIN IN ITS POSITION (OPEN-NOMINAL SETTING) - SEE MDAC-1166.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1174 ABORT: 3/3

ITEM: CB, FES ISOL VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB9

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO SIGNIFICANT EFFECT EXCEPT FOR CIRCUIT PROTECTION AGAINST OVERCURRENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1175 ABORT: 3/3

ITEM: POSITION INDICATION, FES ISOL VALVE (1)
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: DS11

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO SIGNIFICANT EFFECT. THE VALVE POSITION IS DETECTED BY SIGNAL TO THE MDM OF4, OR BY ITS EFFECT DOWNSTREAM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1176 ABORT: 3/3

ITEM: RESISTOR, FES ISOL VALVE (1)
FAILURE MODE: ERRONEOUS OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: A5R1

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF SIGNAL TO THE MDM-OF4. BARBER POLE INDICATION IS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1177 ABORT: 3/3

ITEM: DIODE, FES ISOL VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) FES LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: A10CR11

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF BARBER POLE INDICATION - MDM SIGNAL IS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1178 ABORT: 3/3

ITEM: SUPPLY VALVE, GALLEY (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV9

CAUSES: MECHANICAL SHOCK, VIBRATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
UNDER SINGLE FAILURE NO PROBLEM IS ANTICIPATED SINCE THE VALVE HAS FAILED TO ITS NORMAL SETTING. HOWEVER, CAPABILITY IS LOST TO ISOLATE THE GALLEY LINE IN THE EVENT OF A LEAKAGE. IN THIS CASE, WATER LEAKAGE COULD NOT BE STOPPED. THEREFORE WITH THIS SINGLE FAILURE, MISSION ABORT IS SUGGESTED. FAILURE IS NOT DETECTED UNTIL AN ATTEMPT IS MADE TO CLOSE THE VALVE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1179 ABORT: 3/3

ITEM: SUPPLY VALVE, GALLEY (1)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV9

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POTABLE WATER TO CREW FOR DRINKING, FOOD PREP, HYGIEN,

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1180 ABORT: 2/2

ITEM: SUPPLY VALVE, GALLEY (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV9

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE LEAK CANNOT BE STOPPED, AND IF SEVERE, IT MAY CAUSE ELECTRICAL SHORT, RAISING HUMIDITY IN THE CABIN, CAUSING CONDENSATION IN SOME AREAS OF CABIN: THE EFFECT OF THESE FACTORS IS NOT FULLY UNDERSTOOD TO ASSESS WHETHER A POTENTIAL FOR LOSS OF LIFE EXISTS. HOWEVER, THE MISSION IS TERMINATED AND RETURNED WITH EXISTING PROBLEM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1181 ABORT: 3/3

ITEM: SOLENOID, GALLEY VALVE (1)
FAILURE MODE: FAILS TO CLOSE, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV9

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO ACTIVATE THE VALVE - VALVE REMAINS OPEN - SEE MDAC-1178.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1182 ABORT: 3/3

ITEM: SOLENOID, GALLEY VALVE (1)
FAILURE MODE: FAILS TO OPEN, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV9

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO OPEN THE VALVE - VALVE REMAINS CLOSED - SEE MDAC-1179.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1183 ABORT: 3/3

ITEM: SWITCH, GALLEY VALVE (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S11

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF THE VALVE RECONFIGURATION IF SWITCH CANNOT BE MOVED - SEE MDAC-1178 AND 1179.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1184 ABORT: 3/3

ITEM: SWITCH, GALLEY VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL), ANY SINGLE CONTACT, FAILS TO SWITCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S11

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF POWER INPUT TO ACTIVATE THE VALVE IF THE VALVE COULD NOT BE OPENED OR CLOSED, THE EFFECT IS THE SAME AS MDAC-1178 AND 1179.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1185 ABORT: 3/3

ITEM: SWITCH, GALLEY VALVE (1)
FAILURE MODE: SHORTED, ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S11

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
CONTINUOUS POWER APPLIED TO THE SOLENOID CAUSING IT TO FAIL (BURN), THUS LOSS OF CAPABILITY TO RECONFIGURE THE VALVE THEREAFTER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1186 ABORT: 3/3

ITEM: POSITION INDICATION, GALLEY VALVE (1)
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF BARBER POLE INDICATION; MDM-OF4 AND THE EFFECT OF VALVE ACTION ARE AVAILABLE TO DETECT VALVE POSITION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1187 ABORT: 3/3

ITEM: DIODE, GALLEY VALVE (1)
FAILURE MODE:

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: A10CR8

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF BARBER POLE INDICATION - SEE MDAC-1186.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1188 ABORT: 3/3

ITEM: RESISTOR, GALLEY VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: A7R2

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF SIGNAL TO THE MDM-OF4; BARBER POLE INDICATION IS AVAILABLE TO COMPENSATE FOR THE LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1189 ABORT: 3/3

ITEM: CIRCUIT BREAKER, GALLEY VALVE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB15

CAUSES: CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF POWER TO RECONFIGURE THE VALVE. NOMINALLY NO PROBLEM SINCE THE VALVE IS OPEN ALWAYS, BUT CAPABILITY IS LOST TO CLOSE IT IF NEEDED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1190

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

ITEM: CIRCUIT BREAKER, GALLEY VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: CB15

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO EFFECT, EXCEPT OVER VOLTAGE/OVERCURRENT PROTECTION IS LOST.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1191 ABORT: /NA

ITEM: DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV11

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF PRIMARY METHOD OF EXPELING WATER. FES IS AVAILABLE (WITH 57 DEGREES F RADIATOR) TO BOIL EXCESS WATER, BUT IT MAY IMPACT THE MISSION DUE TO ADDED CREW ACTIVITY. LOSS OF FUNCTION (NO DUMP AND NO 57 DEGREES F FES) WILL CERTAINLY HAVE NO OTHER MEANS OF EXPELING WATER (EXCEPT FOR RAD BYPASS AND FES) - MISSION IMPACT. SEVERE CONTAMINATION IN THE WATER LINE MAY SHUTDOWN DUMP LINE AS WELL AS FES LINE - SCREEN C FAILS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1192 ABORT: /NA

ITEM: DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV11

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
THE VALVE IS CLOSED AND THE CB PULLED FOR ASCENT AND ENTRY. ON-ORBIT, THE VALVE IS CONFIGURED OPEN. HOWEVER, THE DIRECT CROSS-TIE (SUPPLY/WASTE) CAPABILITY WILL BE LOST WITH THE ISOL VALVE FAILED OPEN. THE CROSS-TIE IS USED ONLY UNDER SEVERE CONTINGENCY WHEN NO CAPABILITY EXISTS TO DUMP EITHER WASTE OR SUPPLY WATER. FES IS AVAILABLE FOR FES AND CWC IS AVAILABLE FOR WASTE WATER - ALSO THIS SCENARIO BECOMES MUTI-FAILURE SCENARIO. ON THE OTHER HAND, CROSS-TIE MAY BE STILL USED BY CLOSING THE XOVR VALVE AND TANKS A AND B OUTLET VALVES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 1193 ABORT: 3/3

ITEM: DUMP ISOL VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV11

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FLOW OF WATER TO THE ECLSS BAY. THE CROSSOVER VALVE AND TANKS A & B OUTLET VALVES MUST BE SHUT OFF CLOSED TO ISOLATE THE LEAK, AND THEREFORE BOIL EXCESS WATER THROUGH FES FEEDLINE B. HOWEVER, RECHARGE CAPABILITY FOR MMU AND FES FEEDLINE A BECOME INOPERATIVE. THE EFFECT OF THIS FAILURE ON ASCENT AND ENTRY WAS CONSIDERED MINIMAL DUE TO THE SHORT DURATION OF MISSION PHASE. IF THE LEAKAGE IS SEVERE, IT MAY IMPACT FES OPERATION (LINE A) DURING ASCENT ENTRY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1194 ABORT: 3/3

ITEM: SOLENOID, DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV11

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THE VALVE CONFIGURED CLOSED PRELAUNCH AND REMAINS CLOSED DURING ASCENT, THEREFORE THE FAILURE IS NOT APPLICABLE. DURING ON-ORBIT,THE VALVE IS CONFIGURED OPEN UNTIL AFTER THE LAST DUMP AT WHICH TIME IT IS CLOSED FOR ENTRY. THEREFORE DURING ENTRY THE WATER IN THE LINE BETWEEN THE DUMP ISOL VALVE AND DUMP VALVE MAY FREEZE BUT SINCE THE MISSION IS COMPLETED NO SIGNIFICANT IMPACT IS SEEN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1195 ABORT: /NA

ITEM: SOLENOID, DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO OPEN, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 90V62LV11

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THE VALVE WILL REMAIN CLOSED. SEE MDAC-1191.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1196 ABORT: /NA

ITEM: SWITCH, DUMP ISOL VALVE (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING, FAILS TO SWITCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S6

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO SWITCH THE VALVE OPEN AFTER LIFT OFF. SEE MDAC-1191.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1197 ABORT: /NA

ITEM: SWITCH, DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO OPEN, OPEN (ELECTRICAL) ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S6

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
A MORE SERIOUS CASE IS WHEN CONTACTS BETWEEN THE CLOSE PINS CANNOT BE MADE DUE TO CONTAMINATION. IN THIS THE VALVE CANNOT BE OPENED POST LIFT OFF. SEE MDAC-1191.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1198 ABORT: /NA

ITEM: SWITCH, DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO OPEN, SHORTED, ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S6

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
A SHORT ACROSS THE CLOSE PINS WILL KEEP THE VALVE CLOSED AND APPLY CONTINUOUS POWER TO THE SOLENOID WHICH WILL MAKE IT BURN EVENTUALLY - SEE MDAC-1191. IF THE SWITCH ATIVATED TO OPEN AFTER LIFT OFF AND SHORT HAS OCCURED ACROSS CLOSE PINS, THE SOLENOID WILL RECEIVE POWER ON BOTH TERMINAL - BURN SOLENOID AND POP THE CB.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1199

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

ITEM: POSITION INDICATION, DUMP ISOL VALVE (1)
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: DS4

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF THE WATER POSITION INDICATION BY THE BARBER-POLE. THE MDM OF-4 AND THE EFFECT VALVE POSITION CAN BE USED TO DETECT THE VALVE CONFIGURATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1200 ABORT: 3/3

ITEM: DIODE, DUMP ISOL VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: A10C4

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF BARBER-POLE INDICATION. SEE MDAC-1198.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1201

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

ITEM: RESISTOR, DUMP ISOL VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER: A4R1

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF VALVE POSITION SIGNAL TO THE MDM. BARBER-POLE INDICATION IS AVAILABLE TO COMPENSATE FOR THE LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1202 ABORT: /NA

ITEM: CB, DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB8

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
MOST LIKELY THE CB COULD BE HELD DOWN LONG ENOUGH TO ACTIVATE THE VALVE. BUT WITH SERIOUS FAILURE SUCH THAT POWER COULD NOT BE APPLIED, THE VALVE WILL REMAIN CLOSED AFTER LIFT OFF. SEE MDAC-1191.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1203 ABORT: 3/3

ITEM: CB, DUMP ISOL VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB8

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO SIGNIFICANT IMPACT IS SEEN EXCEPT THAT OVERCURRENT/OVERVOLTAGE PROTECTION IS LOST. SWITCH NEUTRAL POSITION PROVIDES COMPENSATION FOR THE LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1204 ABORT: /NA

ITEM: DUMP VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPD&C
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62LV10

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF PRIMARY METHOD OF EXPELLING EXCESS WATER. FES MAY BE USED (WITH 57 DEGREES F RAD) TO COMPENSATE FOR THE LOSS. EMERGENCY CROSS-TIE IS ALSO AVAILABLE AS A LAST RESORT. HOWEVER, WITH LOSS OF FUNCTION (NO MEANS OF EXPELLING WATER), THE MISSION SHOULD BE TERMIANTED AND RETURNED. ALSO, THE FES USE AS A WAY OF DUMPING WATER MAY IMPACT THE MISSION TIMELINE. SEVERE CONTAMINATION MAY RESTRICT FLOW IN THE DUMP LINE AND FES LINES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1205 ABORT: 3/3

ITEM: DUMP VALVE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPD&C
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62LV10

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF PRIMARY METHOD OF DUMP PROCEDURE RESULTING IN ACTIVATION OF THE DUMP ISOL VALVE INSTEAD TO ACCOMPLISH A DUMP - POSSIBILITY OF WATER TRAPPED IN THE LINE AND FREEZING EXISTS IMMEDIATELY DOWNSTREAM OF THE ISOL VALVE. ALSO, THE DUMP LINE WILL BE EXPOSED TO VACUUM UPON A SUBSEQUENT FAILURE SUCH A INTERNAL LEAKAGE OF THE DUMP ISOL VALVE. IF FREEZING OCCURS IN THE LINE, FES SHOULD BE USED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1206 ABORT: /NA

ITEM: DUMP VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPD&C
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62LV10

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE LINE MUST BE ISOLATED BY DOSING THE DUMP ISOL VALVE AND USING FES FOR WATER DUMPS. SEE MDAC-1204.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1207 ABORT: /NA

ITEM: SOLENOID, DUMP VALVE (1)
FAILURE MODE: FAILS TO OPEN, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62LV10

CAUSES: STRUCTURAL FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THE DUMP VALVE WILL REMAIN CLOSED. SEE MDAC-1204.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1208 ABORT: 3/3

ITEM: SOLENOID, DUMP VALVE (1)
FAILURE MODE: FAILS TO CLOSE, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62LV10

CAUSES: STRUCTURAL FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THE VALVE WILL REMAIN OPEN. SEE MDAC-1205.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1209 ABORT: /NA

ITEM: SWITCH, DUMP VALVE (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S7

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF CAPABILITY TO ACTIVATE/DEACTIVATE THE DUMP VALVE. THE WORST CASE WILL BE THE CASE FOR WHICH THE VALVE CANNOT BE OPENED. SEE REMARKS FOR MDAC-1204.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 1210 ABORT: 3/3

ITEM: SWITCH, DUMP VALVE (1)
FAILURE MODE: SHORTED, ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S7

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
A SHORT ACROSS THE OPEN PINS WILL HAVE NO EFFECT DURING ASCENT OR ENTRY SINCE THE CB IS PULLED AND ALSO THE ISOL VALVE IS CLOSED. HOWEVER, PRIOR TO THE FIRST DUMP AND WITH THIS FAILURE, THE HEATER SWITCH WILL BE ACTIVATED "ON" IN ANTICIPATION FOR A DUMP. THIS PROCESS WILL AUTOMATICALLY OPEN THE DUMP VALVE. AND SINCE THE ISOL VALVE IS OPEN AT THIS TIME, WATER WILL FLOW BEFORE NOZZLE HEATERS DEVELOP ADEUQATE TEMPERATURE, THEREBY RESULTING IN ICE FORMATION OUTSIDE THE NOZZLE. ICE MUST BE REMOVED BEFORE ENTRY IS ATTEMPTED. ATTITUDE CHANGES, EVA, AND/OR RMS MAY BE USED TO BREAK THE ICE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1211 ABORT: /NA

ITEM: SWITCH, DUMP VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL), ANY SINGLE FAILURE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S7

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
THE MORE SEVERE CASE IS FOR OPEN PINS BEING OPEN THAT IS THE VALVE WILL REMAIN CLOSED AND THEREFORE LOSS OF DUMP CAPABILITY. SEE MDAC-1203 REMARKS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1212 ABORT: /NA

ITEM: SWITCH, DUMP NOZZLE HEATER (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING, FAILS TO SWITCH

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S17

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
THIS FAILURE (SWITCH IS JAMMED IN "OFF" POSITION) WILL NEGATE THE OPERATION OF THE DUMP VALVE AND NOZZLE HEATERS - LOSS OF DUMP CAPABILITY. FES OR X-TIE MAY BE USED TO COMPENSATE FOR THE LOSS. THE FAILURE IS ONLY DETECTED WHEN SWITCH ACTIVATION IS ATTEMPTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1213 ABORT: /NA

ITEM: SWITCH, DUMP NOZZLE HEATER (1)
FAILURE MODE: FAILS TO OPEN, OPEN (ELECTRICAL), ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S17

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
THE DUMP VALVE SWITCH CANNOT BE OPERATED TO ACTIVATE THE DUMP VALVE AND THE NOZZLE HEATERS WILL BE INOPERATIVE RENDERING LOSS OF DUMP CAPABILITY. FES OR X-TIE AVAILABLE TO COMPENSATE FOR THE LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1214 ABORT: /NA

ITEM: SWITCH, DUMP NOZZLE HEATER (1)
FAILURE MODE: SHORTED, ANY SINGLE CONTACT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: S17

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO SIGNIFICANT EFFECT SINCE THE REDUNDANT PINS WILL PREVENT FLOW OF ELECTRICITY WHEN THE SWITCH IS TURNED OFF. THE REVERSE ACTION WOULD OPERATE NOMINALLY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1215 ABORT: /NA

ITEM: CIRBUIT BREAKER, DUMP VALVE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB64

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
DIFFICULT TO OPERATE THE NOZZLE HEATERS BY HOLDING DOWN THE CB. IF NOT, THE DUMP CAPABILITY IS LOST SINCE NO POWER WILL BE AVAILABLE TO OPERATE THE DUMP VALVE AND NOZZLE HEATERS - FES AND X-TIE AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1216 ABORT: /NA

ITEM: CIRBUIT BREAKER, DUMP VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL ML86B
PART NUMBER: CB64

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO SIGNIFICANT IMPACT SINCE THE HEATER SWITCH AND DUMP VALVE SWITCH HAVE OFF POSITIONS (NO POWER).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1217 ABORT: 3/3

ITEM: POSITION INDICATION, DUMP VALVE (1)
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: DS5

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, LOSS OF INPUT, VIBRATION

EFFECTS/RATIONALE:
LOSS OF BARBER-POLE INDICATION DETERMINING THE STATUS OF THE SWITCH (DUMP VALVE) POSITION. MDM SIGNALS, AND THE EFFECT OF VALVE POSITION ON THE DUMP LINE ARE AVAILABLE TO COMPENSATE FOR THE LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1218 ABORT: 3/3

ITEM: RESISTOR, DUMP VALVE (2)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: A4R2 AND R3

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF SIGNALS (DUMP VALVE SWITCH POSITION INDICATION AND THE NOZZLE HEATER STATUS) TO THE MDM OF-4. BARBER-POLE INDICATION AND THE NOZZLE TEMPERATURE SENSORS ARE AVAILABLE TO COMPENSATE FOR THE LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1219 ABORT: 3/3

ITEM: DIODE, DUMP VALVE (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL R12A2
PART NUMBER: A10CR5

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF SIGNAL FOR THE BARBER-POLE INDICATION. MDM SIGNALS AND TEMP SENSORS ARE AVAILABLE TO COMPENSATE FOR THE LOSS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1220 ABORT: /NA

ITEM: SENSOR, NOZZLE TEMPERATURE (2)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: V62T0439 AND T0440

CAUSES: PIECE-PART FAILUIRE, THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ONE SENSOR IS NOT SIGNIFICANT, SINCE THE OTHER SENSOR IS STILL AVAILABLE. LOSS OF BOTH SENSORS WILL NEGATE DUMP OPERATION - FES IS AVAILABLE TO EXPEL ADDITIONAL WATER BUT MAY AFFECT MISSION TIMELINE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1221 ABORT: /NA

ITEM: NOZZLE HEATER (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62HR3

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF DUMP CAPABILITY THROUGH THE NOZZLE. SWITCH TO FES TO COMPENSATE FOR THE LOSS. WITHOUT HEATER, WATER FREEZE-UP IS EMMINENT. USE OF FES FOR WATER DUMP MAY IMPACT THE MISSION TIMELINE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1222 ABORT: /NA

ITEM: NOZZLE HEATER (1)
FAILURE MODE: SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62NZ1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
THE HEATER WILL DRAW EXCESSIVE CURRENT POPPING THE CIRCUIT BREAKER RESULTING IN INTERRUPTION AND COOL-DOWN OF THE NOZZLE BAKE-OUT PROCEDURE. DUMP THROUGH THE NOZZLE MAY NOT BE ACCOMPLISH IF CB CANNOT BE HELD DOWN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1223 ABORT: /NA

ITEM: DUMP NOZZLE
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: 40V62NZ1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
EXCESSIVE CONTAMINATION WILL REDUCE THE WATER DUMP FLOW CAUSING ICING PROBLEM AND HINDERING DUMP PROCEDURES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1224 ABORT: /NA

ITEM: DUMP LINE HEATER (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: HTR A AND B

CAUSES: THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ONE HEATER CAN BE COMPENSATED BY SWITCHING TO THE REDUNDANT HEATER. LOSS OF BOTH HEATERS MAY CREATE FREEZING OF WATER IN THE LINE NEGATING DUMP OPERATION AND POSSIBLY RUPTURING THE LINE. FES MAY BE USED TO EXPEL ADDITIONAL WATER.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1225 ABORT: /NA

ITEM: DUMP LINE HEATER (2)
FAILURE MODE: SHORTED

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: HTR A AND B

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
A SHORT WILL DRAW EXCESSIVE CURRENT POPPING THE CB AND/OR CAUSING THE THERMOSTAT TO OPEN. AT ANY RATE, THIS FAILURE WILL INTERRUPT UNIFORM HEATING OF THE HEATER IN THE LINE WHICH MAY CAUSE FREEZING AND BLOCKING OF LINE FOR ANY DUMP OPERATIONS. SWITCH TO REDUNDANT HEATER SET.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1226 ABORT: /NA

ITEM: THERMOSTAT, LINE HEATER (4)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO START

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62S108, 208, 308 AND 408

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF ONE LEG OF HEATER REDUNDANCY (THERMOSTATS - 2 PER SIDE - ARE IN SERIES) - THE OTHER HEATER WILL BE AVAILABLE. LOSS OF FUNCTION (NO THERMOSTAT) WILL PRECLUDE DUMP OPERATION SINCE NO HEATER CAN BE ENERGIZED. DUMP TO BE ACCOMPLISHED THORUGH FES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1227 ABORT: /NA

ITEM: THERMOSTAT, DUMP LINE HEATER (4)
FAILURE MODE: SHORTED, FAILS TO STOP

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4) EPDC
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62S108, 208, 308 AND 408

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
THE AFFECTED THERMOSTAT WILL NOT CYCLE, BUT THE REDUNDANT THERMOSTAT WILL BE ABLE TO SHUT OFF POWER AT HIGHER TEMPERATURE. WARMER WATER IN THE LINE, OTHERWISE NO SIGNIFICANT IMPACT. ALSO, THE RESPECTIVE CB'S MAY BE USED TO DEACTIVATE THE HEATERS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1228 ABORT: /NA

ITEM: QD, CONTINGENCY CROSS-TIE (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: -1101

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:
WATER WILL FLOW CONTINUOUSLY INTO THE CABIN UNLESS THE DUMP LINE IS ISOLATED BY CLOSING THE DUMP ISOLATION VALVE. THEREFORE LOSS OF SUPPLY WATER DUMP THROUGH THE NOZZLE AND SUBSEQUENT SWITCHING TO FES FOR EXPELLING EXCESSIVE WATER. DURING THE ASCENT AND ENTRY THE DUMP ISOL VALVE IS CLOSED AND THE FAILURE OF QD BECOMES NOT APPLICABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1229 ABORT: /NA

ITEM: QD, CONTINGENCY CROSS-TIE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER: -1101

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF CONTINGENCY CROSS-TIE CAPABILITY TO EXPEL SUPPLY WATER THROUGH THE WASTE WATER DUMP NOZZLE. THE CROSS-TIE BECOMES NECESSARY IF THERE IS NO MEANS OF EXPELLING (FES OR NOZZLE) EXCESS WATER. CONSIDERING THIS TO BE A CONTINGENCY ACTION, THE MISSION SHOULD BE TERMINATED AND RETURN WITH WATER FLOW THROUGH FUEL CELLS DEDICATED DUMP LINE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 1230 ABORT: /NA

ITEM: SENSOR, DUMP LINE TEMPERATURE (1)
FAILURE MODE: ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) DUMP LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID FUSELAGE
PART NUMBER: V62T0418A

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF INDICATION TO FIND ANY MALFUNCTIONS WITH THE LINE HEATERS OR THERMOSTATS. UNDER SINGLE FAILURE ONLY, THERE IS NO SIGNIFICANT PROBLEM SINCE HEATERS ARE OPERATING NOMINALLY. WITH A SUBSEQUENT HATER AND/OR THERMOSTAT LOSS, THE LINE MAY FREEZE UP RESULTING IN LOSS OF DUMP CAPABILITY AND USE OF FES INSTEAD.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1231 ABORT: 3/3

ITEM: QD, ECLSS BAY (2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK-ECLSS BAY
PART NUMBER: -3302 AND -1201

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF ONE WATER PORT (CHILLED OR AMBIENT) FOR USE BY THE CREW. ADDITIONAL PORT WILL BE ADEQUATE TO CONTINUE WITHOUT IMPACTING THE MISSION. FUNCTIONAL LOSS WILL PRECLUDE USE OF WATER FOR DRINKING, HYGIENE, FOOD PREP, ...ETC. A SEVERE CONTAMINATION MAY RESTRICT FLOW THROUGH BOTH WATER PORTS - SCREEN C.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1232 ABORT: 3/3

ITEM: QD, GALLEY/DISPENSER (2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF ONE WATER PORT (CHILLED OR AMBIENT) FOR USE BY THE CREW. ADDITIONAL PORT WILL BE ADEQUATE TO CONTINUE WITHOUT IMPACTING THE MISSION. FUNCTIONAL LOSS WILL PRECLUDE USE OF WATER FOR DRINKING, HYGIENE, FOOD PREP, ...ETC. A SEVERE CONTAMINATION MAY RESTRICT FLOW THROUGH BOTH WATER PORTS - SCREEN C.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1233 ABORT: 2/2

ITEM: LINES AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN-UPSTREAM OF THE TANKS INLET VALVES
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLNG/ABUSE, VIBRATION

EFFECTS/RATIONALE:
CONTINUOUS FLOW OF THE FUEL CELLS GENERATED WATER INTO THE MIDDECK AREA - LINE CANNOT BE ISOLATED WITHOUT SHUTTING DOWN THE FUEL CELLS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 1234

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

ITEM: LINES AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN, BETWEEN THE TANKS INLET/OUTLET VALVES
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:
THE AFFECTED TANK SHOULD BE DEPRESSURIZED AND ISOLATED FROM THE LINE BY CLOSING THE INLET/OUTLET VALVES. LOSS OF TANK A WILL HAVE GREATER IMPACT SINCE THE WATER FOR CREW USAGE WILL BE REDUCED SUBSTANTIALLY. ALSO LESS TANKAGE AVAILABLE FOR CONTINGENCY RESERVES AND LESS FLEXIBLE WATER MANAGEMENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1235 ABORT: 2/2

ITEM: LINES AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN, DOWNSTREAM OF THE TANKS OUTLET VALVES
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:
THE MOST SEVERE CASE IS AN EXTERNAL LEAKAGE ON THE LINE DOWNSTREAM OF THE XOVR VALVE. IN THIS CASE, THE FES FEEDLINE A ADN DUMP CAPABILITY WOULD BE LOST SINCE IT WOULD BE NECESSARY TO ISOLATE THE LINE AFTER THE LEAK. WATER MANAGEMENT WILL BE REDUCED TO TANKS C AND D ONLY THROUGH FES FEEDLINE B. THIS FAILURE IS MOST CRITICAL DURING ASCENT/ENTRY WHEN THE FES IS OPERATING ON LINE A.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 1236 ABORT: 2/2

ITEM: LINES AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CABIN, GALLEY LINE
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:
A LEAK UPSTREAM OF THE GALLEY SUPPLY VALVE CANNOT BE STOPPED - LINE CANNOT BE ISOLATED. CONTINUOUS FLOW OF WATER TO THE CABIN AND LOSS OF WATER TO THE CREW THROUGH GALLEY/DISPENSER LINES. IT MAY ALSO STARVE FES DURING ASCENT/ENTRY IF THE LEAKAGE IS APPRECIABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 1237 ABORT: 2/1R

ITEM: WATER CHILLER (1)
FAILURE MODE: INTERNAL LEAKAGE, WCL-H2O

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 9061HX1

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
THIS FAILURE MODE IS COVERED BY THE AIR REVITALIZATION SUBSYTEM (ARS) MDAC-204. IT WILL RESULT IN LOSS OF ONE WCL LOOP AS WELL AS CONTAMINATION OF THE POTABLE WATER FOR CREW USE. A SIMILAR LEAK IN THE REDUNDANT WCL WILL LEAVE NO THERMAL COOLING OF THE CABIN, AVIONICS, ...ETC - POTENTIAL LOSS OF VEHICLE DUE TO LOSS OF AVIONICS EQUIPMENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 1238 ABORT: /NA

ITEM: WATER CHILLER (1)
FAILURE MODE: RESTRICTED FLOW, POTABLE WATER

LEAD ANALYST: M.J. SAIIDI SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SUPPLY WATER SUBSYSTEM
3) GALLEY LINE ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS BAY
PART NUMBER: 9061HX1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
A CONTAMINATION IN THE HX PASSAGES WILL BLOCK FLOW OF CHILLED WATER TO THE CREW. AMBIENT WATER IS AVAILABLE FOR USE, BUT NOT PALATABLE. ARS-201 STUDIED RESTRICTED FLOW FOR WCL - WCL ONLY. IF SEVERE CONTAMINATION OCCURS, THE AMBIENT WATER FLOW WILL BE CLOGGED AND NO WATER WILL BE AVAILABLE TO THE CREW AT ALL - MISSION ABORT.

REFERENCES:

C.2

WASTE MANAGEMENT SUBSYSTEM

Analysis Worksheets

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
2001	3/2R	/NA	P P P	URINAL, MALE AND FEMALE (1)
2002	3/2R	/NA	P P P	URINAL, MALE AND FEMALE (1)
2003	3/2R	/NA	P P P	URINAL COUPLER (1)
2004	3/3	/NA		URINAL CON SCRN PREFILTER(1)
2005	3/3	3/3		URINAL CON SCRN PREFILTER(1)
2006	3/2R	/NA	P P P	URINAL HOSE (1)
2007	3/2R	/NA	P P P	URINAL HOSE (1)
2008 (*)	2/2	/NA		URINAL ADPTR QR (1)
2009	3/2R	/NA	P P P	URINAL ADPTR QR (1)
2010	3/3	/NA		URINAL HOSE CLAMP (1)
2011	3/2R	/NA	P P P	URINAL DYNATUBE (2)
2012	3/2R	/NA	P P P	URINAL DYNATUBE (2)
2013 (*)	2/2	/NA		TUBE, EMU EXTENSION (1)
2014 (*)	2/2	/NA		TUBE, EMU EXTENSION (1)
2015 (*)	2/2	/NA		EMU QD (1)
2016	3/2R	/NA	P P P	COMMODE STORAGE CONTAINER (1)
2017	3/2R	/NA	P P P	COMMODE/LINER (1)
2018	3/2R	/NA	P P P	COMMODE UPPER RING (1)
2019	3/2R	/NA	P P P	COMMODE SLIDE VLV (1)
2020	3/2R	/NA	P P P	COMMODE SLIDE VLV (1)
2021	3/3	/NA		COMPACTOR DRIVE UNIT (1)
2022	3/2R	/NA	P P P	COMPACTOR DRIVE UNIT (1)
2023	3/3	/NA		COMPACTOR DRIVE UNIT (1)
2024	3/2R	/NA	P P P	COMMODE BOTTOM FLANGE (1)
2025	3/3	/NA		COMMODE BOTTOM FLANGE (1)
2026	3/2R	/NA	P P P	COMMODE EXIT, MESH SCRN (1)
2027	3/3	/NA		COMMODE EXIT, MESH SCRN (1)
2028	3/3	/NA		COMMODE VANES (2)
2029	3/3	3/3		AUX. WET TRASH VENT LINE (1)
2030	3/3	3/3		AUX. WET TRASH VENT LINE QD (1)
2031	3/3	3/3		VACUUM PORT LINE (1)
2032	3/3	/NA		VACUUM PORT QD AND PLUG (1)
2033	3/2R	/NA	P P P	VACUUM PORT QD AND PLUG (1)
2034	3/2R	/NA	P P P	VACUUM PORT QD AND PLUG (1)
2035	3/3	3/3		WET TRASH VENT LINE (1)
2036	3/3	3/3		WET TRASH VENT LINE (1)
2037	3/3	3/3		WET TRASH VENT QD (1)
2038	3/2R	/NA	P P P	URINE COLLECTION HOSES (2)
2039	3/2R	/NA	P P P	URINE COLLECTION HOSES
2040	3/2R	/NA	P P P	WCS TO WWS QD (1)
2041 (*)	2/2	/NA		WCS TO WWS QD (1)
2042 (*)	2/2	/NA		WCS TO WWS LINE (1)
2043 (*)	2/2	/NA		WCS TO WWS DYNATUBE (1)
2044	3/3	/NA		WCS TO WWS DYNATUBE (1)
2045	3/2R	/NA	P P P	CCH LINKAGE (1)

(*) Potential Critical Items.

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
2046	3/3	/NA		MANUAL VENT VLV (1)
2047	3/2R	/NA	P P P	MANUAL VENT VLV (1)
2048	3/2R	3/3	P P P	MANUAL VENT VLV (1)
2049	3/2R	/NA	P P P	COMMODE OUTLET CNTRL VLV (1)
2050	3/2R	/NA	P P P	COMMODE OUTLET CNTRL VLV (1)
2051	3/3	/NA		COMMODE OUTLET CNTRL VLV (1)
2052	3/2R	/NA	P P P	COMMODE REPRESS VLV (1)
2053	3/2R	/NA	P P P	COMMODE REPRESS VLV (1)
2054	3/2R	/NA	P P P	COMMODE REPRESS VLV (1)
2055	3/2R	/NA	P P P	BALLAST AIR CONTROL VLV (1)
2056	3/3	/NA		BALLAST AIR CONTROL VLV (1)
2057	3/3	/NA		BALLAST AIR CONTROL VLV (1)
2058	3/2R	/NA	P P P	FAN/SEP VLV (1)
2059	3/3	/NA		FAN/SEP VLV (1)
2060	3/3	/NA		FAN/SEP VLV (1)
2061	3/2R	/NA	P P P	FAN/SEPARATORS (2)
2062	3/2R	/NA	P P P	FAN/SEPARATORS (2)
2063	3/2R	/NA	P P P	FAN/SEPARATORS (2)
2064	3/2R	/NA	P P P	FAN/SEPARATORS (2)
2065	3/3	/NA		FAN/SEP TP (4)
2066	3/3	/NA		FAN/SEP TP (4)
2067	3/3	/NA		FAN/SEP INLET HOSE (1)
2068	3/2R	/NA	P P P	FAN/SEP INLET HOSE (1)
2069	3/2R	/NA	P P P	FAN/SEP INLET HOSE (1)
2070	3/3	/NA		DUAL CHECK VALVES (2)
2071	3/2R	/NA	P P P	DUAL CHECK VALVES (2)
2072	3/2R	/NA	P P P	DUAL CHECK VALVES (2)
2073	3/2R	/NA	P P P	HOSE ASSY, FAN/SEP TO CV (1)
2074	3/3	/NA		MUFFLER HOUSING INLET DUCT (1)
2075	3/3	/NA		BACTERIA FILTER (2)
2076	3/3	/NA		BALLAST VLV SCRN (1)
2077	3/2R	/NA	P N P	BALLAST VLV ASSY (1)
2078	3/3	/NA		BALLAST VLV ASSY (1)
2079	3/3	/NA		COMMODE SEAT (1)
2080	3/2R	/NA	P P P	COMMODE SEAT (1)
2081	3/3	/NA		SEAT BASE (1)
2082	3/3	/NA		THIGH BAR RESTRAINT (2)
2083	3/3	/NA		RESTRAINT HARNESS (THIGH)(4)
2084	3/2R	/NA	P P P	FOOT RESTRAINT (1)
2085	3/3	/NA		FOOT RESTRAINT (1)
2086	3/3	/NA		TOE BAR RESTRAINT (1)
2087	3/3	/NA		TOE BAR RESTRAINT (1)
2088	3/2R	/NA	P P P	APOLLO FECAL BAG (SUFFICIENT)
2089	3/2R	/NA	P P P	UCD (3 DAY SUPPLY)
2090	3/3	/NA		COMMODE PRESS XDCR (1)

(*) Potential Critical Items.

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
2091	3/2R	/NA	P P P	SW, WCS FAN/SEP (1)
2092	3/2R	/NA	P N P	SW, WCS FAN/SEP (1)
2093	3/3	/NA		SW, WCS FAN/SEP (1)
2094	3/3	/NA		WCS MODE SWITCH (1)
2095	3/2R	/NA	P P P	WCS MODE SWITCH (1)
2096	3/3	/NA		WCS MODE SWITCH (1)
2097	3/2R	/NA	P P P	WCS FAN/SEP RELAY (2)
2098	3/2R	/NA	P P P	WCS FAN/SEP RELAY (2)
2199	3/3	/NA		FAN/SEP NOISE SUPPRESSION (1)
2100	3/2R	/NA	P P P	FAN/SEP NOISE SUPPRESSION (1)
2101	3/2R	/NA	P P P	FAN/SEP MOTOR THERMOSTAT (1)
2102	3/2R	/NA	P P P	FAN/SEP MOTOR THERMOSTAT (1)
2103	3/3	/NA		FAN/SEP BYPASS SWITCH (2
2104	3/3	/NA		FAN/SEP BYPASS SWITCH (2
2105	3/2R	/NA	P P P	CB, WCS CNTLR (2)
2106	3/1R	/NA	P P P	CB, WCS CNTLR (2)
2107	3/2R	/NA	P P P	FAN/SEP MOTOR (2)
2108	3/2R	/NA	P P P	FAN/SEP MOTOR (2)
2109	3/2R	/NA	P P P	CB, WCS FAN/SEP (1)
2110	3/2R	/NA	P P P	CB, WCS FAN/SEP (1)
2111 (*)	2/2	3/3		WWS LINE, UNIONS, AND JUNCT (1)
2112 (*)	2/2	3/3		WWS LINE, UNIONS, AND JUNCT (1)
2113 (*)	2/2	3/3		ARS CONDENSATE SUPPLY TUBE (1)
2114 (*)	2/2	3/3		ARS CONDENSATE SUPPLY TUBE (1)
2115	3/2R	/NA	P P P	CWC (1)
2116 (*)	2/2	3/3		WTNK INLET VLV (1)
2117	3/3	/NA		WTNK INLET VLV (1)
2118	3/2R	3/3	P P P	WTNK INLET VLV (1)
2119	3/2R	3/3	P P P	WASTE TANK 1 (1)
2120	3/1R	3/1R	P P P	WASTE TANK 1 (1)
2121	3/2R	3/3	P P P	WTNK LINER (BELLOWS)(1)
2122	3/2R	3/3	P P P	WTNK INLET LINES (1)
2123	3/3	/NA		WTNK OUTLET LINES (1)
2124	3/3	/NA		WTNK FLUID LEVEL XDUCR (1)
2125	3/1R	3/1R	P P P	WTNK N2 LINE (1)
2126	3/3	3/3		WTNK N2 HYDROPHOBIC FLTR (1)
2127	3/2R	/NA	P P P	WTNK DRAIN VLV (1)
2128	3/3	3/3		WTNK DRAIN VLV (1)
2129	3/3	/NA		WTNK DRAIN VLV (1)
2130	3/3	/NA		GSE FILL QD AND PLUG (1)
2131	3/3	3/3		GSE FILL AND PLUG (1)
2132	3/3	/NA		GSE FILL QD AND PLUG (1)
2133	3/3	/NA		GSE DRAIN QD AND PLUG (1)
2134	3/3	/NA		GSE DRAIN QD AND PLUG (1)
2135	3/3	/NA		GSE DRAIN QD AND PLUG (1)

(*) Potential Critical Items.

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
2136 (*)	2/2	/NA		DUMP LINES (1)
2137 (*)	2/2	/NA		DUMP LINES (1)
2138 (*)	2/2	/NA		WWS DMP ISOL VLV (1)
2139 (*)	2/2	2/2		WWS DMP ISOL VLV (1)
2140	3/2R	/NA	P P P	WWS DMP ISOL VLV (1)
2141 (*)	2/2	/NA		QD @ HIGH CAP. FILTER (1)
2142 (*)	2/2	/NA		HIGH CAPACITY FILTER (1)
2143	3/3	/NA		HIGH CAPACITY FILTER (1)
2144 (*)	2/2	/NA		CONT X-TIE QD (1)
2145 (*)	2/1R	2/1R	P P P	WTNK DUMP VLV (1)
2146	3/2R	/NA	P P P	WTNK DUMP VLV (1)
2147 (*)	2/1R	/NA	P P P	WTNK DUMP VLV (1)
2148	3/2R	/NA	P P P	DUMP NOZZLE (1)
2149	3/3	3/3		TANK FLD QTY LVL SENS (1)
2150	3/3	3/3		WTNK FLD LVL SIG COND (1)
2151	3/3	3/3		WTNK INLET VLV (1)
2152	3/3	3/3		WTNK INLET VLV (1)
2153	3/3	3/3		WTNK INLET VLV SWITCH (1)
2154	3/2R	3/3	P P P	WTNK INLET VLV SWITCH (1)
2155	3/3	/NA		WTNK INLET VLV, SOLENOID (2)
2156	3/3	/NA		WTNK INLET VLV, SOLENOID (2)
2157	3/3	3/3		WTNK INLET VLV OPN INDCTR (1)
2158	3/3	3/3		WTNK INLET VLV INDCTR DIODE (1)
2159	3/3	3/3		WTNK INLET VLV INDCTR RESIS (1)
2160	3/3	/NA		CB, WTNK OUTLET VLV (1)
2161	3/3	/NA		CB, WTNK OUTLET VLV (1)
2162	3/3	/NA		WTNK OUTLET VLV SWITCH (2)
2163	3/3	/NA		WTNK OUTLET VLV SWITCH (2)
2164	3/3	/NA		WTNK OUTLET VLV, SOLENOID (1)
2165	3/3	/NA		WTNK OUTLET VLV, SOLENOID (1)
2166	3/3	3/3		SW, WTNK OUTLET VLV INDCTR (1)
2167	3/3	3/3		WTNK OUTLET VLV DIODE (1)
2168	3/3	3/3		WTNK OUTLET VLV RESIS, TO MDM (1)
2169	3/3	/NA		PRESS SENSOR (1)
2170	3/3	/NA		PRESS SENSOR SIG COND (1)
2171 (*)	2/2	/NA		CB, WWS DMP ISOL VLV (1)
2172	3/3	/NA		CB, WWS DMP ISOL VLV (1)
2173 (*)	2/2	/NA		CB, WWS DMP ISOL VLV (1)
2174 (*)	2/2	/NA		CB, WWS DMP ISOL VLV (1)
2175 (*)	2/2	/NA		CB, WWS DMP ISOL VLV (1)
2176 (*)	2/2	/NA		CB, WWS DMP ISOL VLV (1)
2177 (*)	2/2	/NA		CB, WWS DMP ISOL VLV (1)
2178	3/3	3/3		WWS DMP ISOL VLV INDCTR (1)
2179	3/3	3/3		WWS DMP ISOL VLV RESIS, OF2 (1)
2180	3/3	3/3		SW, WWS DMP ISOL INDCTR (1)

(*) Potential Critical Items.

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
2181 (*)	2/1R	3/3	P P P	CB, DMP LINE HTR (1)
2182	3/3	3/3		CB, DMP LINE HTR (1)
2183	3/2R	3/3	P P P	WWS DMP LINE HEATER (2)
2184	3/2R	/NA	P P P	WWS DMP LINE HEATER (2)
2185	3/3	3/3		WWS DMP HTR LINE THERMO (1)
2186	3/2R	3/3	P P P	WWS DMP HTR LINE THERMO (1)
2187	3/2R	/NA	P P P	WWS DMP LINE TEMP XDCR (1)
2188	3/2R	/NA	P P P	WWS DMP LINE TEMP XDCR (1)
2189	3/2R	/NA	P P P	CB, DMP VLV/NOZ HTR (1)
2190	3/3	/NA		CB, DMP VLV/NOZ HTR (1)
2191	3/2R	/NA	P P P	SW, DMP VLV ENA/NOZ HTR (1)
2192	3/2R	/NA	P P P	SW, DMP VLV ENA/NOZ HTR (1)
2193	3/2R	/NA	P P P	SW, DMP VLV ENA/NOZ HTR (1)
2194	3/2R	/NA	P P P	INDCTR, DMP VLV ENA/NOZ HTR (1)
2195 (*)	2/1R	/NA	P P P	SW, WWS DMP VLV (1)
2196 (*)	2/1R	/NA	P P P	SW, WWS DMP VLV (1)
2197 (*)	2/1R	/NA	P P P	SW, WWS DMP VLV (1)
2198 (*)	2/1R	/NA	P P P	WWS DMP VLV SOLENOID (1)
2299 (*)	2/1R	/NA	P P P	WWS DMP VLV SOLENOID (1)
2200	3/3	/NA		WWS DMP VLV SOLENOID (1)
2201	3/3	/NA		DUMP VLV INDCTR RESIS TO OF3 (1)
2202	3/3	/NA		WWS DMP VLV INDCTR DIODE (1)
2203	3/2R	/NA	P P P	DUMP NOZZLE HEATER (1)
2204	3/2R	/NA	P P P	WWS DMP NOZ TEMP XDCR (2)
2205	3/2R	/NA	P P P	WWS DMP NOZ SIG COND (2)
2206	3/3	/NA		WWS DMP NOZ RESIS TO OF4 (1)
2207 (*)	1/1	1/1		CREW MODULE INTERNAL LINE (1)
2208 (*)	1/1	1/1		INTERNAL LINE AND FITTINGS (1)
2209 (*)	1/1	1/1		EXTERNAL LINE AND FITTINGS (1)
2210 (*)	1/1	1/1		DYNATUBE, CREW CABIN (1)
2211 (*)	1/1	3/3		VACUUM VENT NOZZLE (1)
2212	3/3	3/3		VACUUM VENT LINE HTR THERM (2)
2213 (*)	2/1R	/NA	P P P	VACUUM VENT LINE HTR THERM (2)
2214 (*)	2/1R	/NA	P P P	VACUUM VENT LINE HEATER (2)
2215	3/3	/NA		LINE TEMP SIG COND (1)
2216	3/3	3/3		LINE TEMPERATURE SENSOR (1)
2217	3/3	/NA		CB, NOZ HTR (1)
2218 (*)	1/1	/NA		CB, NOZ HTR (1)
2219 (*)	1/1	/NA		SW, NOZ HTR (1)
2220 (*)	1/1	/NA		SW, NOZ HTR (1)
2221	3/3	/NA		RESIS TO MDM OF4 (HTR INDCTR)(1)
2222 (*)	1/1	/NA		VACUUM VENT NOZZLE HEATER (1)
2223	3/3	/NA		VVS NOZZLE TEMPERATURE SENSOR (1)
2224	3/3	/NA		VVS NOZZLE TEMP SENS COND (1)

(*) Potential Critical Items.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2001 ABORT: /NA

ITEM: URINAL, MALE AND FEMALE (1 TYPE PER CREW MEMBER)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3102P1, 199C3082P1]

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:
POSSIBLE WASTE FLUID CONTAMINATION INTO CABIN ATMOSPHERE DUE TO BLOCKAGE OF URINAL HOSE OR FAILURE (CRACKING)OF URINAL HOUSING OR GASKET SEALS. REQUIRES USE OF CONTINGENCY WASTE COLLECTION METHOD.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2002 ABORT: /NA

ITEM: URINAL, MALE AND FEMALE (1 TYPE PER CREW MEMBER)
FAILURE MODE: FAILS TO LATCH

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3102P1, 199C3082P1]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:
REQUIRES CREW MEMBER TO USE CONTINGENCY URINAL COLLECTION BAGS. THERE IS ONLY A 3 DAYS' SUPPLY OF BAGS PER CREW MEMBER, THUS POTENTIAL LOSS OF MISSION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2003 ABORT: /NA

ITEM: URINAL COUPLER (1)
FAILURE MODE: EXTERNAL LEAKAGE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3088G2, P2]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:
POSSIBLE WASTE FLUID CONTAMINATION OF CABIN ATMOSPHERE DUE TO INEFFECTIVE SEALING SURFACE AND GASKETS AND IMPROPER LATCHING OF ASSEMBLY. REQUIRES USE OF ALTERNATE WASTE COLLECTION METHOD.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2004 ABORT: /NA

ITEM: URINAL CONICAL SCREEN PREFILTER (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3083G1]

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
POSSIBLE CONTAMINATION OF CABIN ATMOSPHERE WITH WASTE FLUIDS DUE TO RESTRICTED AIR FLOW. FLIGHT REPLACEABLE HARDWARE, REPLACE FILTER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 2005

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

ITEM: URINAL CONICAL SCREEN PREFILTER (1)
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3083G1]

CAUSES: STRUCTURAL FAILURE

EFFECTS/RATIONALE:
UNFILTERED URINE HOSE, POSSIBLE CABIN CONTAMINATES INTO WCS LINES RESULTING IN POTENTIAL REQUIREMENT FOR CONTINGENCY WASTE COLLECTION METHODS OR AT WORST CASE JAMMING DUMP AND DUMP ISOLATION VALVES-PRODUCING LIFE CRITICAL SITUATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2006 ABORT: /NA

ITEM: URINAL HOSE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 80V62A14 (5.2)

CAUSES: MISHANDLING/ABUSE, CHEMICAL REACTION

EFFECTS/RATIONALE:
WASTE FLUIDS DUMPED ONTO EXTERNAL SURFACE OF HOSE, CONTAMINATION OF CABIN ATMOSPHERE WITH WASTE FLUID AND NOXIOUS GASES. UNDER SEVERE CONDITIONS WILL NEED TO USE URINE COLLECTION BAGS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2007 ABORT: /NA

ITEM: URINAL HOSE (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 80V62A14 (5.2)

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
INEFFECTIVE SUCTION, POSSIBLE CONTAMINATION OF CABIN ATMOSPHERE BY WASTE FLUID BY BACK FLOW INTO CABIN, REQUIRES IMPLEMENTATION OF FLIGHT RULE 13-17 FOR SPILL CLEAN-UP. REQUIRES USE OF ALTERNATE WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2008 ABORT: /NA

ITEM: URINAL ADAPTER QUICK RELEASE (1)
FAILURE MODE: MISALIGNMENT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3016G1]

CAUSES: INADVERTENT OPERATION/ACTIVATION, SHOCK, VIBRATION.

EFFECTS/RATIONALE:
POSSIBLE RELEASE OF URINE/WASTE FLUID CONTAMINANTS INTO CABIN DUE TO IMPROPER FAN/SEPARATOR MANUAL VALVE AND CLAMP QUICK RELEASE OPERATION, ALSO LOSS OF EMU DRAIN LINE CAPABILITY DUE TO PLUGGED LINE, RESULTING IN EMU DUMP LOSS AND SUBSEQUENT LOSS OF EVA CAPABILITY.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2009 ABORT: /NA

ITEM: URINAL ADAPTER QUICK RELEASE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3016G1]

CAUSES: CONTAMINATION, PHYSICAL BINDING/JAMMING OF THE CLAMP, GASKET FAILURE.

EFFECTS/RATIONALE:
WASTE FLUID LEAKAGE INTO CABIN ATMOSPHERE OR STANDBY FAN/SEPARATOR PRODUCING IMPLEMENTATION OF FLIGHT RULE 13-17. REQUIRES USE OF ALTERNATE WASTE COLLECTION PATHS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2010 ABORT: /NA

ITEM: URINAL HOSE CLAMP (1)
FAILURE MODE: IMPROPER CLAMPING FORCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.2) [G.E. DWG 199C3122G1]

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:
FAILURE OF THE CLAMP COULD LEAD TO LEAKAGE OF ADDITIONAL AIR BETWEEN THE URINAL HOSE AND ADAPTER QUICK RELEASE, PRODUCING LOSS IN COLLECTION EFFICIENCY.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2011 ABORT: /NA

ITEM: URINAL DYNATUBE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: MISHANDLING/ABUSE, STRUCTURAL FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
WASTE FLUID LEAKAGE INTO CABIN ENVIRONMENT BECAUSE OF DYNATUBE FAILURE. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2012 ABORT: /NA

ITEM: URINAL DYNATUBE (2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
RESTRICTED FLOW AND OPERATION OF URINAL, POSSIBLE BACK FLOW OF WASTE FLUIDS INTO THE CABIN ATMOSPHERE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2013 ABORT: /NA

ITEM: TUBE, EMU EXTENSION (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 238B5134G1]

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
POSSIBLE INABILITY TO DUMP EMU RESERVOIRS, LOSS OF MISSION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2014 ABORT: /NA

ITEM: TUBE, EMU EXTENSION (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 238B5134G1]

CAUSES: PIECE-PART FAILURE, VIBRATION, CORROSION

EFFECTS/RATIONALE:
INABILITY TO DUMP EMU RESERVIORS WITHOUT FLUID LEAKAGE INTO CABIN ATMOSPHERE, LOSS OF MISSION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2015 ABORT: /NA

ITEM: EMU QD (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) URINE/WASTE FLUID COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 238B5134G1]

CAUSES: CONTAMINATION, PRESSURE (HIGH), CORROSION

EFFECTS/RATIONALE:
INABILITY TO DUMP EMU RESERVIORS WITHOUT FLUID LEAKAGE INTO CABIN ATMOSPHERE, LEADING TO LOSS OF MISSION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2016 ABORT: /NA

ITEM: COMMODE STORAGE CONTAINER (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 47E232901G3]

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
BECAUSE OF CABIN PRESSURE LOSS THRU MANUAL VACUUM VALVE WHILE COMMODE IS NOT IN USE THE VALVE MUST BE CLOSED. THE CLOSURE OF THE MANUAL VENT VALVE PRECLUDES VENTING/DRYING OF THE COMMODE CONTENTS AND POSSIBLE NOXIOUS GAS RELEASE DURING WCS USAGE. IF LEAKAGE IS EXTREMELY SEVERE THE CONTINGENCY WASTE COLLECTION METHODS MUST BE USED. CREW INCONVENIENCE, THE ODOR EFFECT MUST BE EVALUATED AS A REAL TIME DECISION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2017 ABORT: /NA

ITEM: COMMODE/LINER (1)
FAILURE MODE: INTERNAL LEAKAGE, OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 63E905763G2]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
POSSIBLE SOLID AND/OR FLUID WASTE CONTAMINATION OF MUFFLER ASSEMBLY OR WASTE FLUID IN CABIN ATMOSPHERE; REQUIRING ACTIVATION OF FLIGHT RULE 13-17. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2018 ABORT: /NA

ITEM: COMMODE UPPER RING (1)
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 238B5052G1]

CAUSES: PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
FAILURE OF THIS RING OR ATTACHMENT TO COMMODE TANK ALLOWS SOLID WASTE CONTAMINANTS TO ENTER FAN/SEPARATOR LINES, POSSIBLE NOXIOUS FUMES DUE TO SOLID WASTE ENTRAPPED IN MUFFLER ASSEMBLY. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER. THE FAILURE IS DETECTABLE; HOWEVER, THE EXACT CAUSE OF THE FAILURE MAY NOT BE DETERMINED.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2019 ABORT: /NA

ITEM: COMMODE SLIDE VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE, FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 47E232918G2 AND 47E232903P2]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
PRESSURE LOSS DUE TO INABILITY TO CLOSE SLIDE VALVE, WITHOUT CAPABILITY TO VENT COMMODE TO VACUUM, CREATES NOXIOUS OFFGASSING. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2020 ABORT: /NA

ITEM: COMMODE SLIDE VALVE (1)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 47E232903P2 AND 47E232918G2]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO OPEN COMMODE REQUIRES USE OF CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2021 ABORT: /NA

ITEM: COMPACTOR DRIVE UNIT (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 63D717635G2]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO OPERATE COMPACTOR ASSEMBLY AND RESULTING LOSS OF COMMODE EFFICIENCY DUE TO RESTRICTED AIR FLOW.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2022 ABORT: /NA

ITEM: COMPACTOR DRIVE UNIT (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 63D717635G2]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:
FAILURE OF O-RING GASKET SEALS OF DRIVE SHAFT COULD PRODUCE CABIN PRESSURE LEAK THRU VACUUM VENT, REQUIRES MANUAL VACUUM VENT TO BE CLOSED. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2023 ABORT: /NA

ITEM: COMPACTOR DRIVE UNIT (1)
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG 63D717635G2]

CAUSES: STRUCTURAL FAILURE, FRACTURE

EFFECTS/RATIONALE:
SHEARING OF DRIVE SHAFT OR GEARING DOES NOT ALLOW COMPACTING OF SOLID BIOWASTE PRODUCES POSSIBLE COMMODE AIRFLOW INEFFICIENCY, CREW INCONVENIENCE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2024 ABORT: /NA

ITEM: COMMODE BOTTOM FLANGE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
GASKET FAILURE WILL PRODUCE AN CABIN ATMOSPHERE LEAK THROUGH THE MANUAL VACUUM VENT VALVE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2025 ABORT: /NA

ITEM: COMMODE BOTTOM FLANGE (1)
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: STRUCTURAL FAILURE, FRACTURE

EFFECTS/RATIONALE:
WASTE GAS VAPORS INTO CREW CABIN, CAUSING CREW INCONVENIENCE WHICH MUST BE EVALUATED AS A REAL TIME DECISION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2026 ABORT: /NA

ITEM: COMMODE EXIT, MESH SCREEN (1)
FAILURE MODE: RESTRICTED FLOW, BLOCKED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
RESULTS IN INEFFECTIVE COMMODE AIRFLOW AND REDUCED EFFICIENCY. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2027 ABORT: /NA

ITEM: COMMODE EXIT, MESH SCREEN (1)
FAILURE MODE: FAIL OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
THE IMMEDIATE LOSS OF THE FILTER DOES NOT EFFECT USABILITY, HOWEVER LOOSE CONTAMINATION COULD CAUSE FAILURE OF THE WASTE COLLECTION SUBSYSTEM.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2028 ABORT: /NA

ITEM: COMMODE MOVEABLE AND STATIONARY VANES (2)
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) FECAL/EMISIS COLLECTION ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWGS 199C3134P1, 199C3135P1]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO COMPACT COMMODE CONTENTS, CREW INCONVENIENCE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2029 ABORT: 3/3

ITEM: AUX. WET TRASH VENT LINE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF CABIN PRESSURE, REQUIRES CLOSURE OF MANUAL VENT VALVE. NOT POSSIBLE TO VENT COMMODE, PRODUCES NOXIOUS GASES IN COMMODE TANK AFTER ON-ORBIT INSERTION. IF THE LEAK DEVELOPS UPSTREAM OF THE ORIFICE, THE LEAK IS RESTRICTED TO 3 POUNDS/DAY.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2030 ABORT: 3/3

ITEM: AUX. WET TRASH VENT LINE QD (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION, VACUUM

EFFECTS/RATIONALE:
LOSS OF PROPER VENTILATION OF THE WET TRASH VENT PATH, OTHERWISE NO SIGNIFICANT PROBLEM.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2031 ABORT: 3/3

ITEM: VACUUM PORT LINE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
PRODUCE LESS EFFICIENT VENTILATION OF THE WET TRASH AREA. THE COMMODE AND THE MANUAL VENT VALVE MAY STILL BE USED NOMINALLY, BUT SOME NOXIOUS GASES WILL LEAK INTO THE CABIN. THE UPSTREAM ORIFICE WILL RESTRICT THE LEAKAGE FLOW WITH THE VENT VALVE OPEN.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2032 ABORT: /NA

ITEM: VACUUM PORT QD AND PLUG (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
WHEN THE QD IS CONNECTED, IT IS POSSIBLE TO DEVELOP AN EXTERNAL LEAK DUE TO LINE FITTING CONTAMINATION. THE VACUUM VENT IS ONLY USED IN THE EVENT OF A MAJOR FLUID SPILL. THIS LEAK WOULD BE A CABIN PRESSURE LEAK THAT WOULD HAVE TO BE EVALUATED ON A REAL TIME BASIS. AN EXTERNAL LEAK WITH THE QD PLUG IN PLACE IS UNLIKELY.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 2033

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

ITEM: VACUUM PORT QD AND PLUG (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
IMPOSSIBLE TO USE VACUUM VENT AS A MEANS TO DISPERSE A FLUID SPILL, MUST RELY ON ALTERNATE COLLECTION METHODS SUCH AS URINE/WASTE FLUID COLLECTION SYSTEM.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 2034

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

ITEM: VACUUM PORT QD AND PLUG (1)
FAILURE MODE: MATE AND DEMATE FAILURE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO USE VACUUM VENT LINE FOR FLUID SPILL CLEAN-UP OR TO USE VACUUM PORT TO DRAW A VACUUM. POTENTIAL MISSION IMPACT IF SECONDARY METHODS ALSO FAIL.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 2035

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

ITEM: WET TRASH VENT LINE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90, DOWNSTREAM OF ORIFICE
PART NUMBER: WCS 80V62A14

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
UNRESTRICTED LOSS OF CABIN PRESSURE, REQUIRES CLOSURE OF MANUAL VACUUM VENT VALVE. PRODUCES NOXIOUS GAS BUILD-UP IN COMMODE AND WET TRASH CONTAINERS, NO MISSION EFFECT OTHER THAN CREW DISCOMFORT.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2036 ABORT: 3/3

ITEM: WET TRASH VENT LINE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90, UPSTREAM OF ORIFICE
PART NUMBER: WCS 80V62A14

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
RESTRICTED LOSS OF CABIN PRESSURE. REDUCTION IN WET TRASH CONTAINER VENTILATION, BUT NO EFFECT ON MISSION SCHEDULE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 2037

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

ITEM: WET TRASH VENT QD (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
PRODUCES RESTRICTED CABIN PRESSURE LOSS. PRODUCES A REDUCTION IN WET TRASH CONTAINER VENTILATION, BUT NO EFFECT ON MISSION SCHEDULE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2038 ABORT: /NA

ITEM: URINE COLLECTION HOSES (2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90 (FROM MANUAL DIVERTER VALVE TO FAN/SEP)
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:
RESTRICTED FLOW TO FAN/SEPARATORS, POSSIBLE RELEASE OF WASTE FLUIDS INTO CABIN ATMOSPHERE. REQUIRES USE OF ALTERNATE FAN/SEPARATOR LINE FOR URINE COLLECTION. LOSS OF PRIMARY URINE COLLECTION METHOD REQUIRES USE OF CONTINGENCY URINE COLLECTION BAGS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2039 ABORT: /NA

ITEM: URINE COLLECTION HOSES
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90 (FROM MANUAL DIVERTER VALVE TO FAN/SEP)
PART NUMBER: WCS 80V62A14

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
LEAKAGE OF WASTE FLUIDS INTO CABIN ATMOSPHERE. REQUIRES USE OF ALTERNATE FAN/SEPARATOR SYSTEM. IF ALL ELSE FAILS, MUST USE CONTINGENCY URINE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2040 ABORT: /NA

ITEM: WCS TO WWS QD (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
EXCESSIVE BACK PRESSURE ON FAN/SEPARATOR, CAUSING OVERFLOW OF FAN SEPARATOR RESERVOIR WITH WASTE FLUIDS INTO CABIN ATMOSPHERE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTIONWASTE FLUIDS INTO CABIN ATMOSPHERE DEVICES PER CREW MEMBER. POTENTIAL FLOODING DURING EMU DUMP INTO CABIN BY WAY OF URINE HOSE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 2041

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/2
ABORT: /NA

ITEM: WCS TO WWS QD (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [5.22]

CAUSES: VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
WASTE FLUID LEAKAGE INTO WCS ENCLOSURE AND CABIN ATMOSPHERE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER. THE FLUID LEAKAGE ALSO PRODUCES AN ARS CONDENSATE SPILL BECAUSE THE WASTE TANK 1 IS PRESSURIZED TO 30 PSIA AND FLUID WILL TRAVEL OUT THE LEAK POINT. THIS IS A MISSION IMPACT ITEM BECAUSE ARS CONDENSATE SYSTEM WOULD HAVE TO BE SHUT DOWN IF THE LEAK IS TO BE ELIMINATED.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2042 ABORT: /NA

ITEM: WCS TO WWS LINE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: OVERLOAD, PIECE-PART FAILURE, IONIZING RADIATION, VIBRATION, CHEMICAL REACTION, VACCUM

EFFECTS/RATIONALE:
LEAKAGE OF WASTE FLUIDS INTO CREW MODULE MIDDECK FLOOR SPACE, REQUIRES SHUTTING DOWN WCS AND USE OF CONTINGENCY WASTE COLLECTION METHODS. THIS PRODUCES A LEAKAGE OF ARS CONDENSATE AND TO PRECLUDE THE LEAK THE ARS MUST BE SHUT DOWN, THUS LIMITING MISSIOM LIFE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2043 ABORT: /NA

ITEM: WCS TO WWS DYNATUBE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: OVERLOAD, PIECE-PART FAILURE, PRESSURE (HIGH), VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
WASTE FLUID LEAK INTO THE WCS ENCLOSURE AND CABIN ATMOSPHERE, REQUIRES APPLICATION OF FLIGHT RULE 13-17 FOR NOXIOUS FLUID SPILL. PRODUCES ARS CONDENSATE SPILL BECAUSE THE WASTE TANK 1 IS PRESSURIZED TO 30 PSIA AND FLUID WILL TRAVEL OUT LEAK POINT. THIS IS A MISSION IMPACT BECAUSE THE ARS CONDENSATION UNIT WOULD HAVE TO BE SHUT DOWN AT THE SEPARATOR IF THE LEAK IS TO BE CONTROLLED OR ELIMINATED.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2044 ABORT: /NA

ITEM: WCS TO WWS DYNATUBE (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
DURING EMU DUMP IT IS POSSIBLE TO GET LEAKAGE UP THE URINAL HOSE INTO THE CREW CABIN DUE TO EXCESSIVE BACK PRESSURE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER, OR EXCESSIVE BACKPRESSURE ON FAN/SEPARATORS, CAUSING FAN/SEPARATOR OVERFLOW AND WASTE FLUID/NOXIOUS GASES INTO CABIN ENVIRONMENT VIA MUFFLER/EXHAUST PORT.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2045 ABORT: /NA

ITEM: COMMODE CONTROL HANDLE LINKAGE (1)
FAILURE MODE: FAILS TO SWITCH, LOSS OF OUTPUT. PHYSICAL BINDING/JAMMING (ANY POSITION)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWGS 47D232927G2-4, G6, P8]

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, VIBRATION, CONTAMINATION

EFFECTS/RATIONALE:
INEFFECTIVE WCS OPERATION, REQUIRES USE OF CONTINGENCY APOLLO COLLECTION BAGS. LOSS OF "UP MOTION" PRECLUDES REPRESSURIZATION OF COMMODE FOR USE OR STORAGE AND LOSS OF "GATE OPEN" SLIDE MOTION PRECLUDES COMMODE USAGE ARE THE WORST CASE FAILURE MODES. OTHER FAILURE EFFECT IS, IN IMPROPER SEQUENCE OF SWITCHING, CAUSING WASTE GASES INTO CABIN ATMOSPHERE DURING USE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2046 ABORT: /NA

ITEM: MANUAL VENT VALVE (1)
FAILURE MODE: FAILS TO OPEN, PHYSICAL BINDING/JAMMING, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.8)[G.E. DWG 47D264875G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
CANNOT VENT COMMODE, WET TRASH OR AUX. WET TRASH FOR DRYING OF WET OR FECAL MATERIAL, ALLOWS BUILDUP OF NOXIOUS ODORS IN COMMODE, BUT COMMODE STILL FUNCTIONAL. IF NOXIOUS GASES BECOME TOO INTOLERABLE THE EFFECT ON MISSION SCHEDULE BECOMES A REAL-TIME JUDGEMENT

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2047 ABORT: /NA

ITEM: MANUAL VENT VALVE (1)
FAILURE MODE: FAILS TO CLOSE, PHYSICAL BINDING/JAMMING, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.8)[G.E. DWG 47D264875G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
IMPOSSIBLE TO REPRESSURIZE COMMODE AND USE WCS SLIDE GATE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2048 ABORT: 3/3

ITEM: MANUAL VENT VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.8)[G.E. DWG 47D264875G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
HIGHER LOSS OF CABIN ATMOSPHERE THAN ANTICIPATED PAST GASKET SEALS DUE TO RESTRICTED ATMOSPHERE LOSS THROUGH VACUUM VENT VALVE WHEN CLOSED. IMPOSSIBLE TO DEPRESSURIZE COMMODE. SUBSEQUENT LOSS OF VACUUM VENT ISOLATION VALVE WILL CAUSE MAJOR CABIN PRESSURE LOSS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2049 ABORT: /NA

ITEM: COMMODE OUTLET CONTROL VALVE (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.10)[G.E. DWG 47D264875G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
IMPOSSIBLE TO USE COMMODE AS STORAGE CONTAINER AFTER DEPRESSURIZATION OF TANK. MUST USE CONTINGENCY WASTE COLLECTION METHODS IN ANY CASE. REPRESSURIZATION FROM THE WET TRASH VENT LINES MAY BE POSSIBLE BUT VERY SLOW.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2050 ABORT: /NA

ITEM: COMMODE OUTLET CONTROL VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.10)[G.E. DWG 47D264875G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
VALVE DOES NOT CLOSE TO FAN/SEPARATOR LINE. POSSIBLE LOSS OF CABIN ATMOSPHERE THROUGH MANUAL VACUUM VENT VALVE. REQUIRES CLOSURE OF MANUAL VENT VALVE OR VACUUM VENT ISOLATION VALVE TO RESTRICT CABIN ATMOSPHERE LOSS. CREW INCONVENIENCE, THE ODOR EFFECT
MUST BE EVALUATED AS A REAL TIME DECISION. THE URINE/WASTE COLLECTION SYSTEM IS STILL OPERATIONAL.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT OF ESSESSMENT
ORBITER SUBSYSTEM S WORKSHEET

DATE: 7/28/87 IGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2051 ABORT: /NA

ITEM: COMMODE OUTLET L VALVE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN S LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTAL
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRIT A ES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 3) [G.E. DWG 47D264875G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
POSSIBLE LOSS OF CABIN ATMOSPHERE DUST GASKET SEALS DURING COMMODE EVACUATION AND REDUCED AIR FLOW DURING COMMODE OPERATION. CREW INCONVENIENCE AND DISCOMFORT, REAL TIME DECISION ON MISSION EFFECT.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2052 ABORT: /NA

ITEM: COMMODE PRESSURIZATION VALVE (1)
FAILURE MODE: RESTRICTED FLOW, FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.11A)[G.E. DWG 47A232860P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO REPRESSURIZE THE COMMODE, POSSIBLE BIOWASTE INTO CREW CABIN. REQUIRES CONTINGENCY BIOWASTE STORAGE METHODS OTHER THAN COMMODE STORAGE AREA.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2053 ABORT: /NA

ITEM: COMMODE PRESSURIZATION VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.11A)[G.E. DWG A47A232860P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
POSSIBLE LEAKAGE INTO CREW CABIN OF NOXIOUS GAS AND WASTES THROUGH VALVE BODY.
NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2054 ABORT: /NA

ITEM: COMMODE PRESSURIZATION VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.10) [G.E. DWG 47D264875G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
POSSIBLE LOSS OF CABIN ATMOSPHERE OR SEEPAGE OF WASTE FLUIDS/SOLIDS INTO THE WCS ENCLOSURE THROUGH VALVE BODY. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2055 ABORT: /NA

ITEM: BALLAST AIR CONTROL VALVE (1)
FAILURE MODE: RESTRICTED FLOW, FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.11B)[G/E/ DWG 47A232860P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
RESTRICTED AIR FLOW TO SEPARATORS, POSSIBLE WASTE FLUIDS DUMPED INTO CABIN AIR THROUGH FAN SEPARATOR MUFFLER OUTLET OR THE 5.30 PARTICULATE SCREEN. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2056 ABORT: /NA

ITEM: BALLAST AIR CONTROL VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.11B)[G.E. DWG 47A232860P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOWER AIRFLOW FROM COMMODE COULD PRODUCE REDUCED EFFICIENCY BUT WOULD ONLY CAUSE CREW INCONVENIENCE. NO MISSION IMPACT.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2057 ABORT: /NA

ITEM: BALLAST AIR CONTROL VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.11B)[G.E. DWG 47A232860P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
POSSIBLE SEEPAGE OF WASTE GASES INTO WCS ENCLOSURE. CREW INCONVENIENCE, THE ODOR EFFECT MUST BE EVALUATED AS A REAL TIME DECISION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2058 ABORT: /NA

ITEM: FAN/SEPARATOR VALVE (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.28B)[G.E. DWG. 47A232859P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO OPEN VALVE FOR SELECTED FAN/SEPARATOR, REQUIRES USAGE OF CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2059 ABORT: /NA

ITEM: FAN/SEPARATOR VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.28B)[G.E. DWG 47A232859P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO SWITCH TO NEW FAN/SEPARATOR AND EFFECT AND A GOOD SEAL. NO EFFECT ON MISSION OR LIFE OF VEHICLE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2060 ABORT: /NA

ITEM: SEPARATOR VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) VALVE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (VALVE 5.28B) [G.E. DWG 47A232859P1]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
POSSIBLE SEEPAGE OF WASTE FLUIDS INTO WCS ENCLOSURE THROUGH VALVE BODY SEALS AND REDUCED COMMODE VENTILATION EFFICIENCY.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2061 ABORT: /NA

ITEM: FAN/SEPARATORS (2)
FAILURE MODE: INTERNAL LEAKAGE (WATER TO AIR)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [G.E. DWG. 47E225362G2, G4]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
FAILURE OF GASKET SEAL ON FLUID RESERVOIR TO BLOWER HOUSING, ULTIMATELY WASTE FLUID INTO CABIN AIR BY WAY OF MUFFLER. THE IMMEDIATE EFFECT OF THE LEAK WOULDN'T BE VISIBLE UNTIL LEAKAGE AT MUFFLER. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2062 ABORT: /NA

ITEM: FAN/SEPARATORS (2)
FAILURE MODE: RESTRICTED WATER FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [G.E. DWG. 47E225362G2, G4]

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
DUMPING OF WASTE FLUID INTO CABIN AIR DUE TO BLOCKAGE OF THE PITOT TUBE, EXCESSIVE FLUID DUMP QUANTITY, OR FECAL/EMISIS CONTAMINATION BLOCKAGE OF FAN/SEPARATOR ASSEMBLY. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2063 ABORT: /NA

ITEM: FAN/SEPARATORS (2)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [G.E. DWG. 47E225362G2, G4]

CAUSES: MECHANICAL SHOCK, PIECE PART FAILURE, VIBRATION, CONTAMINATION,

EFFECTS/RATIONALE:
BREAKAGE OF PIECE PART STRUCTURE, THUS JAMMING FAN/MOTOR AND HALTING MOTOR OPERATION. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS. IF ALTERNATE FAN/SEPARATOR ALSO DOES NOT FUNCTION THEN CANNOT DO SUBSEQUENT EVA'S BECAUSE EMU DRAIN IS LOST.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2064 ABORT: /NA

ITEM: FAN/SEPARATORS (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [G.E. DWG. 47E225362G2, G4]

CAUSES: CONTAMINATION, PIECE PART FAILURE, PRESSURE (HIGH), VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
FAILURE OF GASKET SEALS WOULD ALLOW WASTE FLUIDS INTO CABIN ATMOSPHERE REQUIRING IMPLEMENTATION OF FLIGHT RULE 13-17 FOR FLUID SPILLS. REQUIRES RESORTING TO ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2065 ABORT: /NA

ITEM: FAN/SEPARATOR TEST PORTS (4)
FAILURE MODE: FAILS TO OPEN, PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:
INABILITY TO CHECK WCS FLOW PATHS, NO MISSION EFFECT EXCEPT EXTENDED TURNAROUND TIME.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2066 ABORT: /NA

ITEM: FAN/SEPARATOR TEST PORTS (4)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
REDUCED FLOW RATE FROM SPECIFICATION, ON-GROUND REPAIR. NO MISSION SCHEDULE IMPACT EXCEPT EXTENDED TURNAROUND TIME.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2067 ABORT: /NA

ITEM: FAN/SEPARATOR INLET HOSE FROM COMMODE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: STRUCTURAL FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
JUST NOXIOUS GAS EMISSIONS AND POSSIBLY INSUFFICIENT FLOW THROUGH COMMODE. THE FAILURE IS DETECTABLE; HOWEVER, THE EXACT CAUSE OF THE FAILURE MAY NOT BE DETERMINED.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2068 ABORT: /NA

ITEM: FAN/SEPARATOR INLET HOSE FROM URINAL (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
WASTE FLUID LEAKAGE INTO WCS ENCLOSURE. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS. IF ALTERNATE FAN/SEPARATOR DOES NOT FUNCTION, THEN CANNOT PURGE EMU AND NO SUBSEQUENT EVA'S ARE POSSIBLE. MISSION SCHEDULE ALTERATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2069 ABORT: /NA

ITEM: FAN/SEPARATOR INLET HOSE FROM URINAL (1)
FAILURE MODE: FAILS CLOSED, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
RESTRICTED INLET FLOW FROM URINAL, POTENTIAL STOPPED FLOW AND LOSS OF URINAL USAGE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2070 ABORT: /NA

ITEM: DUAL CHECK VALVES (2)
FAILURE MODE: FAILS TO REMAIN CLOSED (SINGLE STAGE), INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 80V62A14 (TP120) [G.E. DWG. 47A232884P2]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
POSSIBLE WASTE FLUID BACKFLOW IN FAN SEPARATORS AND CABIN AIR IF BOTH CHECK VALVES FAIL. VIEWED NOT CRITICAL BECAUSE SECOND STAGE CHECK VALVE PRECLUDES LEAKAGE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2071 ABORT: /NA

ITEM: DUAL CHECK VALVES (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (TP120) [G.E. DWG. 47A232884P2]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CORROSION

EFFECTS/RATIONALE:
POSSIBLE LEAKAGE OF WASTE FLUIDS INTO WCS ENCLOSURE AND CABIN ATMOSPHERE. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS. IF ALTERNATE FAN/SEPARATOR DOES NOT FUNCTION, THEN CANNOT PURGE EMU AND NO SUBSEQUENT EVA'S ARE POSSIBLE.
MISSION SCHEDULE ALTERATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2072 ABORT: /NA

ITEM: DUAL CHECK VALVES (2)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (TP120) [G.E. DWG. 47A232884P2]

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INEFFECTIVE FAN/SEPARATOR OPERATION REQUIRING USE OF ALTERNATE FAN/SEPARATOR UNIT OR ALTERNATE WASTE COLLECTION METHOD DUE TO WASTE FLUID IN CABIN ATMOSPHERE. IF ALTERNATE FAN/SEPARATOR DOES NOT FUNCTION, THEN CANNOT PURGE EMU AND NO SUBSEQUENT EVA'S ARE POSSIBLE. MISSION SCHEDULE ALTERATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2073 ABORT: /NA

ITEM: HOSE ASSEMBLY, SEPARATOR TO CHECK VALVE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: PIECE-PART FAILURE, CORROSION, STRUCTURAL FAILURE (RUPTURE)

EFFECTS/RATIONALE:
WASTE FLUID CONTAMINATION INTO WCS ENCLOSURE AND CABIN ATMOSPHERE. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS. IF ALTERNATE FAN/SEPARATOR DOES NOT FUNCTION, THEN CANNOT PURGE EMU AND NO SUBSEQUENT EVA'S ARE POSSIBLE. MISSION SCHEDULE ALTERATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2074 ABORT: /NA

ITEM: MUFFLER HOUSING INLET DUCT (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6) MUFFLER HOUSING INSTALLATION
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.1)

CAUSES: CONTAMINATION, PIECE-PART FAILURE, STRUCTURAL FAILURE (RUPTURE)

EFFECTS/RATIONALE:
LEAK OF NOXIOUS FUMES INTO CREW CABIN DUE TO DUCT OR COUPLING LEAKAGE. CREW INCONVENIENCE, THE ODOR EFFECT MUST BE EVALUATED AS A REAL TIME DECISION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2075 ABORT: /NA

ITEM: BACTERIA FILTER (2)
FAILURE MODE: OPEN, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) FAN/SEPARATOR
6) MUFFLER HOUSING INSTALLATION
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (5.1)

CAUSES: CONTAMINATION, STRUCTURAL FAILURE (RUPTURE)

EFFECTS/RATIONALE:
LEAKAGE OF NOXIOUS FUMES INTO CABIN AIR, REPLACE FILTER. CREW INCONVENIENCE, THE ODOR EFFECT MUST BE EVALUATED AS A REAL TIME DECISION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2076 ABORT: /NA

ITEM: BALLAST VALVE SCREEN (1)
FAILURE MODE: RESTRICTED FLOW, CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) BALLAST VALVE
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG. 199C3110P2]

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
INSUFFICIENT AIRFLOW TO URINAL, EXCESSIVE DRAG ON FAN/SEPARATOR MOTORS. CLEAN SCREEN. IF FLOW IS BLOCKED, CANNOT USE URINAL OR EMU DRAIN WITHOUT COMMODE BEING OPEN.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2077 ABORT: /NA

ITEM: BALLAST VALVE ASSEMBLY (1)
FAILURE MODE: FAILS MID-TRAVEL, PHYSICAL BINDING/JAMMING, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) BALLAST VALVE
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG. 47C265767G2]

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION, INADVERTENT OPERATION/ACTIVATION

EFFECTS/RATIONALE:
INSUFFICIENT AIRFLOW TO URINAL, EXCESSIVE DRAG ON FAN/SEPARATOR MOTORS. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2078 ABORT: /NA

ITEM: BALLAST VALVE ASSEMBLY (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) LIQUID AND AIR LINE INSTALLATION
5) BALLAST VALVE
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG. 47C265767G2]

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
POTENTIAL FOR NOT SWITCHING BALLAST VALVE POSITION REQUIRING MAINTENANCE OF VALVE POSITION. THERE IS A POSSIBLE OUTGASSING FROM THE AUXILLIARY WET TRASH OR WASTE TISSUE CONTAINERS. CREW INCONVENIENCE, THE ODOR EFFECT MUST BE EVALUATED AS A REAL TIME DECISION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2079 ABORT: /NA

ITEM: COMMODE SEAT (1)
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 [G.E. DWG. 47E232800G2]

CAUSES: STRUCTURAL FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
LOOSE COMMODE SEAT IN WCS ENCLOSURE, REQUIRES USE OF TAPE TO MAINTAIN FUNCTIONAL POSITION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2080 ABORT: /NA

ITEM: COMMODE SEAT (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 80V62A14 [G.E. DWG. 47E232800G2]

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF SEAT TO REMAIN IN A STABLE POSITION WHEN CREWMEMBER IS STRAPPED DOWN COULD YIELD INEFFECTIVE OPERATION. WORST CASE DOES NOT ALLOW USE OF SEAT, MUST USE CONTINGENCY WASTE COLLECTION METHODS, BUT CAN STILL USE COMMODE FOR STORAGE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2081 ABORT: /NA

ITEM: SEAT BASE (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 80V62A14 [G.E. DRAWING 47E232751G1]

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF EFFECTIVE AIRFLOW THROUGH SEAT BASE PASSAGES, CREW INCONVENIENCE AND INEFFECTIVE COMMODE USAGE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2082 ABORT: /NA

ITEM: THIGH BAR RESTRAINT (2)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: G.E. DWG. 63E905736G1

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:
REQUIRES USE OF ALTERNATE THIGH RESTRAINT SYSTEM.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2083 ABORT: /NA

ITEM: VELCRO RESTRAINT HARNESS (THIGH)(4)
FAILURE MODE: CLIP FAILURE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: G.E. DWG. 63E905736G1

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO USE VELCO HARNESS ASSEMBLY, MUST RELY ON ALTERNATE RESTRAINT METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2084 ABORT: /NA

ITEM: FOOT RESTRAINT (1)
FAILURE MODE: FAILED STOWED POSITION

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: G.E. DWG. 63E905736G1

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, VIBRATION.

EFFECTS/RATIONALE:
INABILITY TO USE COMMODE DUE TO ACCESS PROBLEM, MUST USE CONTINGENCY WASTE COLLECTION METHODS FOR FECAL/EMISSIS BIOWASTE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2085 ABORT: /NA

ITEM: FOOT RESTRAINT (1)
FAILURE MODE: FAILED DEPLOYED POSITION

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: G.E. DWG. 63E905736G1

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION.

EFFECTS/RATIONALE:
CREW INCONVENIENCE AT EGRESS, NO MISSION IMPACT.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2086 ABORT: /NA

ITEM: TOE BAR RESTRAINT (1)
FAILURE MODE: FAILS TO REMAIN IN OPERABLE POSITION, FAILS CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: G.E. DWG. 47D265876G1

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO EFFECTIVELY RESTRAIN FEET DURING STAND-UP URINATION, REQUIRES ALTERNATE RESTRAINT SYSTEM WHICH MAY BE INCONVENIENT TO CREW USAGE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2087 ABORT: /NA

ITEM: TOE BAR RESTRAINT (1)
FAILURE MODE: FAILED DEPLOYED POSITION

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) CREW RESTRAINT ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: G.E. DWG. 47D265876G1

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO PROPERLY STOW TOE BAR RESTRAINT. INCONVENIENCE FOR CREW AT EGRESS, BUT NO MISSION IMPACT

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2088 ABORT: /NA

ITEM: APOLLO FECAL BAG (MISSION LIFE SUPPLY)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ALTERNATE WASTE COLLECTION SYSTEM
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: MISHANDLING/ABUSE, STRUCTURAL FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
PRODUCES WASTE SPILL TO CABIN ATMOSPHERE THAT REQUIRES USE OF FLIGHT RULE 13-17. SEE GROUND RULE 1.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2089 ABORT: /NA

ITEM: URINE COLLECTION DEVICE (3 DAYS SUPPLY PER CREWMEMBER)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ALTERNATE WASTE COLLECTION SYSTEM
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
PRODUCES WASTE FLUID IN CABIN ATMOSPHERE, AND REQUIRES USE OF FLIGHT RULE 13-17. SEE GROUND RULE 1.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2090 ABORT: /NA

ITEM: COMMODE PRESSURE TRANSDUCER (1)
FAILURE MODE: FAILS OUT OF TOLERANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (V62P0505A)

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
INEFFECTIVE INDICATION OF MANIFOLD VALVE HOUSING PRESSURE, REQUIRED TO USE SPECIFIED REPRESSURIZATION TIME (10-30 SECONDS) BEFORE COMMODE ACTUATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2091 ABORT: /NA

ITEM: WCS FAN/SEPARATOR SWITCH (1)
FAILURE MODE: FAILS MID-TRAVEL, PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SUBSYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (WCS S4)

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

EFFECTS/RATIONALE:
INABILITY TO ACTUATE VALVE 5.28 CAUSING RESTRICTED FLOW. RESULTS IN LOSS OF ABILITY TO USE REDUNDANT FAN/SEPARATOR, REQUIRES USE OF CONTINGENCY WASTE COLLECTION METHODS IF FAN/SEPARATOR FAILS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2092 ABORT: /NA

ITEM: WCS FAN/SEPARATOR SWITCH (1)
FAILURE MODE: SHORTED CONTACT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (D&C PANEL WCS, S4)

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
TWO FAILURE MODES: (1) IF SHORTED TO GROUND IT "POPS" CIRCUIT BREAKER OF SELECTED FAN/SEPARATOR AND MUST ACTIVATE ALTERNATE FAN/SEPARATOR. (2) IF ALTERNATE FAN/SEPARATOR CONTACTS ARE SHORT CLOSED, THEN DRIVING BOTH FAN/SEPARATORS AT ONCE CAUSING NO IMPACT, BECAUSE IF SECOND FAN OVERHEATS THE THERMOSTAT WILL OPEN CONTACTS UNTIL COOL-DOWN IS PRECIPITATED.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2093 ABORT: /NA

ITEM: WCS FAN/SEPARATOR SWITCH (1)
FAILURE MODE: FAILS OPEN (SINGLE CONTACT)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (D&C PANEL WCS, S4)

CAUSES: ACOUSTICS, CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO ACTUATE FAN/SEPARATOR MOTORS WITHOUT USING SEPARATOR BYPASS SWITCH.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2094 ABORT: /NA

ITEM: WCS MODE SWITCH (1)
FAILURE MODE: FAILS MID-TRAVEL, PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (D&C PANEL WCS, S1)

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:
INABILITY TO COMPLETE FAN/SEPARATOR ENERGIZING CIRCUIT WITHOUT USING SEPARATOR BYPASS SWITCH.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2095 ABORT: /NA

ITEM: WCS MODE SWITCH (1)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (D&C PANEL WCS, S1)

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
2 FAILURE MODES: (1) IN THE CASE OF SHORTED TO GROUND, THE ASSOCIATED CIRCUIT BREAKER "POPS" AND THE ALTERNATE FAN/SEPARATOR CIRCUIT BREAKER AND SWITCH MUST BE ACTIVATED (3/2R) TO THE ALTERNATE FAN/SEP. (2) THE OTHER CASE IS SHORTED ACROSS TERMINALS TO
WHERE THE FAN/SEPARATOR MUST BE CONTROLLED BY THE CIRCUIT BREAKER (3/3).

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2096 ABORT: /NA

ITEM: WCS MODE SWITCH (1)
FAILURE MODE: OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (D&C PANEL WCS, S1)

CAUSES: ACOUSTICS, CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO MAINTAIN FAN/SEPARATOR RELAY ENERGIZING CIRCUIT WITHOUT USING SEPARATOR BYPASS SWITCH.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2097 ABORT: /NA

ITEM: WCS FAN/SEPARATOR RELAY (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: WCS 80V62A14
PART NUMBER: RELAY K1 AND K2

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INOPERABLE RELAY FOR ANY SINGLE LOSS OF CONTACT OR RELAY COIL CIRCUIT OPEN, MUST SWITCH TO ALTERNATE FAN/SEPARATOR CIRCUIT BREAKER OR CONTINGENCY WASTE COLLECTION METHOD.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2098 ABORT: /NA

ITEM: WCS FAN/SEPARATOR RELAY (2)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: WCS 80V62A14
PART NUMBER: RELAY K1 AND K2

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
WORST CASE IS SHORT TO GROUND, ACTIVATING CIRCUIT BREAKER AND REQUIRING USE OF ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS. SHORT ACROSS SINGLE CONTACT WOULD CAUSE CONTINUAL (SINGLE PHASE) POWER TO MOTOR, AND EVENTUALLY CAUSING MAJOR BURN-OUT AND NEED FOR USE OF ALTERNATE FAN/SEPARATORS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2099 ABORT: /NA

ITEM: FAN/SEPARATOR NOISE SUPPRESSION CIRCUIT (4)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: WCS 80V62A14
PART NUMBER: G.E. DWG 47C238872

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
UNFILTER AC VOLTAGE, NO MISSION EFFECT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2100 ABORT: /NA

ITEM: FAN/SEPARATOR NOISE SUPPRESSION CIRCUIT(4)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: WCS 80V62A14
PART NUMBER: G.E. DWG 47C238872 (FAN/SEP 1 & 2)

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO SWITCH OFF FAN/SEPARATOR MOTOR FOR SINGLE PHASE LINE, THUS CAUSING EXCESSIVE HEATING OF MOTOR WINDINGS AND EVENTUAL FAILURE AND NEED FOR ALTERNATE FAN/SEPARATOR SYSTEM. IF SHORTED TO GROUND, THIS CAUSES THE CIRCUIT BREAKER TO POP, THUS REQUIRING USE OF ALTERNATE FAN/SEPARATOR.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2101 ABORT: /NA

ITEM: FAN/SEPARATOR MOTOR THERMOSTATIC SWITCH (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [FAN/SEP 1 & 2]

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
POSSIBLE MOTOR BURNOUT DUE TO EXCESSIVE TEMPERATURE. SWITCH TO ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION DEVICES.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2102 ABORT: /NA

ITEM: FAN/SEPARATOR MOTOR THERMOSTATIC SWITCH (2)
FAILURE MODE: FAILS TO REMAIN CLOSED, FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [FAN/SEP 1 & 2]

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO USE THE FAN/SEPARATOR BECAUSE OF DEACTIVATED SOLENOID SWITCH. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2103 ABORT: /NA

ITEM: FAN/SEPARATOR BYPASS SWITCH (2)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (SWITCH S6 AND S7)

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO USE FAN/SEPARATOR BYPASS SWITCH AND NO ACTIVATION OF FAN/SEPARATOR IN THE EVENT OF WCS CONTROL SWITCH FAILURE.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2104 ABORT: /NA

ITEM: FAN/SEPARATOR BYPASS SWITCH (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (SWITCH S6 AND S7)

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION, INADVERTENT OPERATION/ACTIVATION

EFFECTS/RATIONALE:
MUST USE CIRCUIT BREAKER TO REMOVE POWER FROM CIRCUIT. IF ALTERNATE BYPASS SWITCH IS SHORTED CLOSED THEN COULD RUN ALTERNATE MOTOR WITHOUT PROPER COOLING AND ACTIVATE THERMOSTATIC SWITCH--PRODUCING AN INTERMITTENT OPERATION PROBLEM UNLESS THE ASSOCIATED CIRCUIT BREAKER IS OPENED.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2105 ABORT: /NA

ITEM: CIRCUIT BREAKER, WCS CNTLR (2)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B
PART NUMBER: 80V73A130, WCS CNTLR, CB19 AND CB22

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

EFFECTS/RATIONALE:
INOPERATIVE FAN/SEPARATOR CONTROLLER, INABILITY TO USE THE FAN/SEPARATOR. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 2106 ABORT: /NA

ITEM: CIRCUIT BREAKER, WCS CNTLR (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B
PART NUMBER: 80V73A130, WCS CNTLR, CB10 AND 22

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF OVERLOAD PROTECTION, OTHERWISE NO OTHER EFFECT UNLESS A SHORT TO GROUND OCCURS IN EITHER THE BYPASS SWITCH OR FAN/SEPARATOR SWITCH, IN WHICH CASE THERE IS POTENTIAL FOR FIRE DUE TO OVERHEATING OF THE WIRES.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2107 ABORT: /NA

ITEM: FAN/SEPARATOR MOTOR (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [G.E. DRAWINGS 47E225363P2]

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK.

EFFECTS/RATIONALE:
ELECTRIC MOTOR FAILURE, CAUSES USE OF REDUNDANT SYSTEMS. MOTOR WILL NOT START WITH A SINGLE PHASE FAILURE. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS. IF ALTERNATE FAN/SEPARATOR DOES NOT FUNCTION, THEN CANNOT PURGE EMU AND NO SUBSEQUENT EVA'S ARE POSSIBLE. MISSION SCHEDULE ALTERATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2108 ABORT: /NA

ITEM: FAN/SEPARATOR MOTOR (2)
FAILURE MODE: SHORT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: WCS 80V62A14 (ITEM 5.5) [G.E. DRAWINGS 47E225363P2]

CAUSES: STRUCTURAL FAILURE, CONTAMINATION

EFFECTS/RATIONALE:
INSUFFICIENT CURRENT/VOLTAGE TO ELECTRIC MOTOR DUE TO POPPED CIRCUIT BREAKER OR EXCESSIVE CURRENT DRAW THROUGH MOTOR CAUSING OVERHEATING AND BURN-OUT REQUIRES USE OF REDUNDANT SYSTEMS. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS. IF ALTERNATE FAN/SEPARATOR DOES NOT FUNCTION, THEN CANNOT PURGE EMU AND NO SUBSEQUENT EVA'S ARE POSSIBLE. MISSION SCHEDULE ALTERATION.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2109 ABORT: /NA

ITEM: CIRCUIT BREAKER, WCS FAN/SEPARATOR, AC BUS, SINGLE PHASE (6)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SUBSYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D & C PANEL 85V73A129
PART NUMBER: CB47 AND CB50

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

EFFECTS/RATIONALE:
LOSS OF SINGLE PHASE POWER TO FAN/SEPARATOR AND LOSS OF TOTAL FAN/SEPARATOR OPERATION. USE ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2110 ABORT: /NA

ITEM: CIRCUIT BREAKER, WCS FAN/SEPARATOR, AC BUS, SINGLE PHASE (6)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SUBSYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE COLLECTION SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D & C PANEL 85V73A129
PART NUMBER: CB47 AND CB50

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
INDICATED POPPING OF OTHER ASSOCIATED FAN/SEPARATOR CIRCUIT BREAKERS AND LOSS OF OVER-CURRENT PROTECTION, REQUIRES DEACTIVATION OF CURRENT FAN/SEPARATOR AND ACTIVATION OF ALTERNATE FAN/SEPARATOR OR CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) WCS ASSEMBLY [G.E. DWG 47J232750G16]; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DWG. NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2111 ABORT: 3/3

ITEM: WWS LINE, UNIONS, AND JUNCTIONS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
WASTE FLUID LEAK INTO CABIN ATMOSPHERE AND CABIN PRESSURE LOSS DURING WASTE FLUID DUMP. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREWMEMBER. PRODUCES ARS CONDENSATE SPILL BECAUSE THE WASTE TANK 1 IS PRESSURIZED TO 30 PSIA AND FLUID WILL TRAVEL OUT LEAK POINT. THIS IS A MISSION IMPACT BECAUSE THE ARS CONDENSATION UNIT WOULD HAVE TO BE SHUT-DOWN AT THE SEPARATOR IF THE LEAK IS TO BE CONTROLLED OR ELIMINATED.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2112 ABORT: 3/3

ITEM: WWS LINE, UNIONS, AND JUNCTIONS
FAILURE MODE: RESTRICTED FLOW, CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
EXCESSIVE LOAD ON FAN/SEPARATOR. POSSIBLE PLUGGING OF LINES. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREWMEMBER.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2113 ABORT: 3/3

ITEM: ARS CONDENSATE SUPPLY TUBE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
PRODUCES LEAKAGE OF ARS CONDENSATE AND WCS FLUIDS INTO CABIN ATMOSPHERE, REQUIRES IMPLEMENTATION OF FLIGHT RULE 13-17. LOSS OF MISSION, NO METHOD FOR ARS CONDENSATE DUMPING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2114 ABORT: 3/3

ITEM: ARS CONDENSATE SUPPLY TUBE (1)
FAILURE MODE: RESTRICTED FLOW, CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO METHOD OF ARS CONDENSATE DUMP PRODUCES CONDENSATE INTO CREW CABIN ATMOSPHERE AND POTENTIAL FOR SHORTING THE ELECTRICAL SYSTEM.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960120, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2115 ABORT: /NA

ITEM: CONTINGENCY WATER CONTAINER (1)
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: USED AS BACKUP WASTE FLUID TANK (UNTESTED APPROACH)

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, STRUCTURAL FAILURE, PRESSURE (HIGH), CHEMICAL REACTION

EFFECTS/RATIONALE:
LEAKAGE OF WASTE FLUIDS INTO CABIN ATMOSPHERE IF CONTAINER RUPTURES OR IF CONTAINER PRESSURE GETS TOO GREAT THEN THE BACKPRESSURE IN THE FAN/SEPARATOR CAUSES DUMPING OF WASTE FLUIDS INTO THE CABIN THROUGH THE WCS MUFFLER.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2116 ABORT: 3/3

ITEM: WASTE TANK 1 INLET VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV16

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
FAILURE OF VALVE SEALS PRODUCES WASTE FLUID LEAK FROM THE COMMODE AND ARS CONDENSATE DUMP LINE INTO CABIN ATMOSPHERE. IF NO METHOD TO COLLECT ARS CONDENSATE, THE MISSION SCHEDULE IS EFFECTED AS WELL AS EMU DUMP CAPABILITY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2117 ABORT: /NA

ITEM: WASTE TANK 1 INLET VALVE (1)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV16

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

EFFECTS/RATIONALE:
INABILITY TO SEAL VALVE AND POSSIBLE WASTE FLUID LEAK UPON DE-ORBIT IF CHECK VALVES FAIL. INABILITY TO ISOLATE THE WASTE TANK IN THE EVENT OF A SUBSEQUENT FAILURE ON-ORBIT, THUS CAUSING MISSION LOSS OR SCHEDULE IMPACT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2118 ABORT: 3/3

ITEM: WAIST TANK 1 INLET VALVE (1)
FAILURE MODE: RESTRICTED FLOW. INADVERTANT OPERATION (CLOSURE)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV16

CAUSES: CONTAMINATION, PIECE-PART FAILURE, LOSS OF INPUT, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
THE RESTRICTED FLOW COULD CAUSE EXCESSIVE BACKPRESSURE ON THE FAN/SEPARATORS, THUS CAUSING OVERFLOW INTO CABIN ATMOSPHERE. INADVERTENT CLOSURE REQUIRES HOOKING UP CONTINGENCY WATER CONTAINER, WHICH IF THAT FAILS THE CONTINGENCY CROSS-TIE TO THE MUST BE USED. IN EITHER CASE A FAILURE OF THE ARS CONDENSATE DUMP CAPABILITY WILL CAUSE BACKUP INTO CABIN. BECAUSE OF SHORT DURATION OF ASCENT/ENTRY PHASE IT IS VIEWED AS NOT MISSION CRITICAL IF IT OCCURRED DURING THESE MISSION PHASES.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2119 ABORT: 3/3

ITEM: WASTE TANK 1 (1)
FAILURE MODE: INTERNAL LEAKAGE (WASTE TANK TO BLADDER SEAL), BLADDER RUPTURE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO DETERMINE FLUID LEVELS BECAUSE OF MIXING OF WASTE FLUID AND GN2 AND CONTAMINATION OF N2 LINES, REQUIRES SEALING OF WASTE TANK. THIS SCENARIO IS BASED ON THE ASSUMPTION THAT THE GN2 HYDROPHOBIC FILTER PRECLUDES WASTE FLUID IN THE GN2 LINES. NEED TO USE CONTINGENCY WATER CONTAINER (CWC).

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 2120 ABORT: 3/1R

ITEM: WASTE TANK 1 (1)
FAILURE MODE: EXTERNAL LEAKAGE (WASTE TANK TO BLADDER SEAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	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 [2] B [P] C [P]

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
LEAKAGE OF WASTE FLUIDS INTO MIDDECK "BELOW DECKS" AREA OR LEAKAGE OF GN2 INTO CABIN ATMOSPHERE. POTENTIALLY FATAL CONDITION IF NOT CORRECTED BY CREW BY SHUTTING DOWN GN2 PRESSURIZATION SYSTEM BECAUSE OF UNREGULATED RELEASE OF GN2 INTO THE CABIN ATMOSPHERE. NEED TO USE CONTINGENCY WATER CONTAINER (CWC).

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2121 ABORT: 3/3

ITEM: WASTE TANK 1 LINER (BELLOWS)(1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: RI DWG. V070-623022

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
JAMMING OF METAL BELLOWS RESTRICTS OPERATION OF WASTE WATER TANK. NEED TO CLOSE INLET VALVE AND USE THE CONTINGENCY WATER CONTAINER (CWC).

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960120, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2122 ABORT: 3/3

ITEM: WASTE TANK 1 INLET LINES AND COUPLINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: V62Q0540A

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

EFFECTS/RATIONALE:
WASTE FLUID LEAK INTO MIDDECK FLOOR STORAGE AREA, REQUIRES CONTINGENCY WASTE COLLECTION METHOD, MORE CRITICAL CONDITION IS THE CABIN PRESSURE LOSS DURING DUMP PROCESS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2123 ABORT: /NA

ITEM: WASTE TANK 1 OUTLET LINES AND COUPLINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: V62Q0540A

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

EFFECTS/RATIONALE:
WASTE FLUID LEAK INTO MIDDECK LOWER FLOOR AREA DURING GSE (POST LANDING/PRELAUNCH). REQUIRES SPILL CLEANUP.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2124 ABORT: /NA

ITEM: WASTE TANK FLUID LEVEL TRANSDUCER (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING, LOSS OF OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: V62Q0540A

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO DETERMINE TANK FLUID LEVEL, REQUIRES USE OF CONSOLE CHART TIMELINES FOR DUMP SCHEDULE. CREW WOULD PERFORM SYSTEMATIC DUMPS BASED ON GROUND SUPPORT PREFLIGHT PREDICTIONS ON CONSOLE CHARTS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 2125 ABORT: 3/1R

ITEM: WASTE TANK N2 LINE AND COUPLINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	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 [2] B [P] C [P]

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF N2 PRESSURIZATION CAPABILITY AND NO BACKPRESSURE ON WASTE TANK BLADDER, UNABLE TO EFFECTIVELY DUMP TANK OVERBOARD. UNRESTRICTED RELEASE OF N2 INTO CABIN ATMOSPHERE - INABILITY OF ATMOSPHERE REGULATOR TO CONTROL O2/N2 PARTIAL PRESSURES YIELDS A POTENTIALLY LETHAL CONDITION DUE TO GAS DEPLETION.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2126 ABORT: 3/3

ITEM: WASTE TANK N2 HYDROPHOBIC FILTER (1)
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62FL1

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT ON WASTE FLUID DISPOSAL UNLESS THE WASTE TANK 1 BLADDER HAS RUPTURED ALSO. WHEN THE WASTE TANK BLADDER RUPTURES, THE SUPPLY WATER GN2 SUPPLY VALVES MUST BE CLOSED THUS ELIMINATING SUPPLY TANK B, C AND D FROM USE AND EFFECTING MISSION LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2127 ABORT: /NA

ITEM: WASTE TANK 1 DRAIN VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV17

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
LEAKAGE OF WASTE FLUID INTO CABIN ATMOSPHERE, REQUIRES USE OF FLIGHT RULES 13-17 FOR CLEAN-UP. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER. DUE TO SHORT DURATION OF ASCENT, DESCENT AND ABORT CASES, THE EFFECTS WERE CONSIDERED INSIGNIFICANT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2128 ABORT: 3/3

ITEM: WASTE TANK 1 DRAIN VALVE (1)
FAILURE MODE: INTERNAL LEAKAGE, FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER STORAGE ASSEMBLY
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV17

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
POSSIBLE LEAK AT GSE DRAIN, OR VACUUM LEAK (LOSS OF CABIN PRESSURE) IF DOUBLE FAILURE OCCURS, OTHERWISE NO EFFECT..

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2129 ABORT: /NA

ITEM: WASTE TANK 1 DRAIN VALVE (1)
FAILURE MODE: RESTRICTED FLOW, FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV17

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
POSSIBLE INABILITY TO DO GROUND SERVICE MAINTENANCE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2130 ABORT: /NA

ITEM: GSE FILL QD AND PLUG (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62TP101

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO PERFORM GROUND SERVICE MAINTENANCE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2131 ABORT: 3/3

ITEM: GSE FILL AND PLUG (1)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SUBSYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62TP101

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO SEAL LINE WITHOUT PLUG DURING GROUND SERVICING, NO MISSION IMPACT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2132 ABORT: /NA

ITEM: GSE FILL QD AND PLUG (1)
FAILURE MODE: EXTERNAL LEAKAGE, FAILURE TO MATE OR DEMATE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62TP101

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LEAKAGE DURING GROUND SERVICING, NO MISSION EFFECT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2133 ABORT: /NA

ITEM: GSE DRAIN QD AND PLUG (1)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62TP100

CAUSES: CONTAMINATION, PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
INABILITY TO PERFORM GROUND SERVICE MAINTENANCE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2134 ABORT: /NA

ITEM: GSE DRAIN QD AND PLUG (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62TP100

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
INABILITY TO SEAL LINE WITHOUT PLUS DURING GROUND SERVICING, NO MISSION IMPACT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2135 ABORT: /NA

ITEM: GSE DRAIN QD AND PLUG (1)
FAILURE MODE: EXTERNAL LEAKAGE, FAILS TO MATE OR DEMATE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) STORAGE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62TP100

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LEAKAGE DURING GROUND SERVICING, NO MISSION EFFECT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2136 ABORT: /NA

ITEM: DUMP LINES, FITTINGS, JOINTS AND UNIONS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90, AND M.D. BODY AREA 40
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LEAKAGE OF WASTE FLUIDS INTO BELOW MIDDECK AREA TRACKED BY FLUID LEVEL LOSS IN WASTE TANK 1, OR CABIN ATMOSPHERE PRESSURE DURING WASTE TANK DUMP. THE DUMP ISOLATION VALVE MUST BE SHUT TO PRECLUDE EITHER WASTE FLUID IN THE CABIN, CABIN PRESSURE LOSS OR FREEZING OF FLUIDS IF THE RUPTURE OCCURS OUTSIDE OF THE CABIN. THE RESULTANT ARS CONDENSATE STORAGE CAPACITY RESTRICTION TO THE REMAINING SPACE IN THE WASTE TANK COULD EFFECT MISSION SCHEDULE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2137 ABORT: /NA

ITEM: DUMP LINES, FITTINGS AND CONNECTIONS
FAILURE MODE: RESTRICTED FLOW, BLOCKED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90 AND MID BODY AREA 40
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, LINE/NOZZLE HEATER FAILURE

EFFECTS/RATIONALE:
RESTRICTED DUMP FLOW. THE WORST CASE IS BLOCKED FLOW REQUIRING USE OF CONTINGENCY CROSS-TIE CONNECTION, BLOCKAGE IS DOWNSTREAM OF CONNECTION OR USE OF CONTINGENCY WATER CONTAINER, OR CONTINGENCY WASTE COLLECTION METHODS BLOCKAGE IS UPSTREAM OF CONTINGENCY CROSS-TIE. ARS CONDENSATE STORAGE IS LIMITED TO REMAINING SPACE IN WASTE TANK 1 AND COULD EFFECT MISSION SCHEDULE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2138 ABORT: /NA

ITEM: WASTE TANK 1 DUMP ISOLATION VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER STORAGE ASSEMBLY
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV15

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
LOSS OF CABIN PRESSURE DURING WASTE FLUID DUMP AND LEAKAGE OF WASTE FLUIDS INTO CREW MODULE DURING WASTE FLUID STORAGE. POTENTIAL MISSION LOSS BECAUSE OF NO WAY TO DISPOSE OF ARS CONDENSATE AND THEY MUST BE SHUT DOWN TO ELIMINATE LEAKAGE INTO CABIN. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2139 ABORT: 2/2

ITEM: WASTE TANK 1 DUMP ISOLATION VALVE (1)
FAILURE MODE: RESTRICTED FLOW, FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV15

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
LOSS OF EFFECTIVE BACKUP TO WASTE TANK DUMP VALVE; POSSIBLE REDUCTION OR LOSS OF MISSION IF VALVE FAILS CLOSED, IMPOSSIBLE TO DO WASTE FLUID TANK DUMP, REQUIRES CONTINGENCY WASTE COLLECTION METHODS, NO MEANS OF DUMPING ARS CONDENSATE FORCING LOSS OF MISSION DUE TO LIMITED CAPACITY OF WASTE TANK 1 CAPACITY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2140 ABORT: /NA

ITEM: WASTE TANK 1 DUMP ISOLATION VALVE (1)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV15

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
IN THE EVENT OF THE LOSS OF THE DUMP VALVE OR DURING RE-ENTRY WHEN THE VALVE IS CLOSED THIS IS THE SINGLE ITEM TO PROTECT FROM UNRESTRICTED CABIN PRESSURE LOSS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960120, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2141 ABORT: /NA

ITEM: QD AND TP @ HIGH CAP. FILTER (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62TP130, 90V62TP131

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
WASTE FLUID LEAKAGE INTO CREW MODULE AND/OR CABIN PRESSURE LOSS DURING WASTE TANK DUMP OR IF DUMP ISOLATION VALVE FAILS. REQUIRES CLOSURE OF THE DUMP ISOLATION VALVE AND RESTRICTION OF THE ARS CONDENSATE TO THE REMAINING SPACE IN THE WASTE TANK 1 WHICH COULD EFFECT THE MISSION SCHEDULE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2142 ABORT: /NA

ITEM: HIGH CAPACITY FILTER (1)
FAILURE MODE: RESTRICTED FLOW, BLOCKED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER STORAGE ASSEMBLY
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62FL3

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
WASTE TANK DUMP RATES OR BLOCKED FLOW. USE OF CONTINGENCY WASTE COLLECTION METHODS AND USE WASTE TANK 1 FOR ARS CONDENSATE DUMP. RESTRICTED MISSION SCHEDULE IS A RESULT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2143 ABORT: /NA

ITEM: HIGH CAPACITY FILTER (1)
FAILURE MODE: FAILS OPEN, RUPTURE OF FILTER

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62FL3

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, CHEMICAL REACTION

EFFECTS/RATIONALE:
NO IMMEDIATE EFFECTS, POTENTIAL FOR CORROSION OR BLOCKAGE OF QD'S OR VALVES DOWNSTREAM.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960120, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2144 ABORT: /NA

ITEM: CONTINGENCY H2O CROSS-TIE QD AND PLUG (1)
FAILURE MODE: INABILITY TO MATE OR DE-MATE, FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 80V62TP103 (MC276-0020-1101)

CAUSES: CONTAMINATION, PIECE-PART FAILURE, BURRING

EFFECTS/RATIONALE:
LOSS OF WASTE FLUID DUMP OR WASTE TANK USAGE, REQUIRES CONTINGENCY WASTE COLLECTION METHODS. MISSION SCHEDULE IMPACT DUE TO USE OF CONTINGENCY WASTE COLLECTION METHODS AND LOSS OF ARS CONDENSATE DUMP CAPABILITY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2145 ABORT: 2/1R

ITEM: WASTE TANK 1 DUMP VALVE (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62LV14

CAUSES: PIECE-PART FAILURE, IONIZING RADIATION, VIBRATION

EFFECTS/RATIONALE:
WASTE FLUID LEAK INTO MIDFUSELAGE AREA. REQUIRES USE OF DUMP ISOLATION VALVE AS PRIMARY DUMP VALVE. IF DUMP ISOLATION VALVE FAILS COULD SUFFER CABIN PRESSURE LOSS. THE REQUIRED CLOSURE OF THE DUMP ISOLATION VALVE RESTRICTS WASTE TANK 1 USAGE TO ARS CONDENSATE DUMP AND USE OF CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2146 ABORT: /NA

ITEM: WASTE TANK 1 DUMP VALVE (1)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62LV14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, IONIZING RADIATION, VIBRATION, LOSS OF SOLENOID INPUT

EFFECTS/RATIONALE:
UNABLE TO DO STANDARD WASTE FLUID DUMP, REQUIRES CONTINGENCY MEASURES, EITHER CONTINGENCY CROSS-TIE HOOKUP OR CONTINGENCY WATER CONTAINER USAGE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2147 ABORT: /NA

ITEM: WASTE TANK 1 DUMP VALVE (1)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62LV14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION, LOSS OF SOLENOID INPUT

EFFECTS/RATIONALE:
UNABLE TO CLOSE VALVE AT END OF DUMP, REQUIRES USE OF DUMP ISOLATION VALVE AS PRIMARY VALVE AGAINST CABIN PRESSURE LOSS, OR USE OF CONTINGENCY WASTE FLUID COLLECTION METHODS. THE CLOSURE OF THE DUMP ISOLATION VALVE RESTRICTS ARS CONDENSATE DUMP TO WASTE TANK 1 QUANTITY. WASTE WATER DUMP IS STILL POSSIBLE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2148 ABORT: /NA

ITEM: DUMP NOZZLE (1)
FAILURE MODE: RESTRICTED FLOW, BLOCKED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) DUMP LINE ASSEMBLY
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62TP102

CAUSES: CONTAMINATION, THERMAL SHOCK, FROZEN WASTE FLUIDS

EFFECTS/RATIONALE:
IMPOSSIBLE TO DO WASTE FLUID DUMP FROM THIS LINE IF LINE IS BLOCKED, REQUIRES RECYCLING OF NOZZLE HEATERS OR ALTERNATE DUMP METHODS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2149 ABORT: 3/3

ITEM: TANK FLUID QUANTITY LEVEL SENSOR (1)
FAILURE MODE: ERRONEOUS OUTPUT, OUT OF TOLERANCE OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62MT5

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION, IMPROPER VOLTAGE INPUT

EFFECTS/RATIONALE:
ERRONEOUS FLUID LEVEL INDICATION, MUST RELY ON PRESSURE TRANSDUCER OR CONSOLE CHART FOR FLUID LEVEL INDICATION AND DUMP SCHEDULE. SYSTEMICALLY DUMP TANK TO PRECLUDE EXCESSIVE FILLING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2150 ABORT: 3/3

ITEM: TANK FLUID LEVEL SIGNAL CONDITIONER (1)
FAILURE MODE: IMPROPER VOLTAGE LEVEL

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FORWARD AVIONICS BAY 1, AREA 81
PART NUMBER: 81V75A16, 5 VOLT DC POWER SUPPLY

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
INACCURATE WASTE TANK FLUID LEVEL INDICATION, MUST RELY ON PRESSURE TRANSDUCER FOR FLUID LEVEL INDICATION AND CONSOLE CHARTS FOR DUMP SCHEDULE..

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2151 ABORT: 3/3

ITEM: TANK INLET VALVE CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, PREMATURE OPERATION, OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL ML86B, CB16
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO POWER TO VALVE FOR FLUID DUMP, NO MISSION EFFECT. THE VALVE IS NORMALLY CONFIGURED OPEN, THUS NO MISSION EFFECT UNLESS A SUBSEQUENT FAILURE OCCURS IN THE WASTE FLUID STORAGE TANK AND LINES, IN WHICH CASE TANK ISOLATION WOULD NOT BE FEASIBLE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2152 ABORT: 3/3

ITEM: TANK INLET VALVE CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO OPEN, DELAYED OPERATION

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL ML86B, CB16
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE VALVE STATUS IS NOT NORMALLY CHANGED FROM PRELAUNCH TO LANDING, EXCEPT FOR GROUND SERVICING AND CHECKOUT. IN THE CASE OF FAILURE DURING SERVICING IT IS A DELAY, BUT NOT CRITICAL. IF THE FAILURE IS DUE TO SHORTING ACROSS OPEN AND CLOSE SOLENOID CONTACTS BETWEEN ASCENT THRU DEORBIT IT IS POSSIBLE THAT THE VALVE COULD CLOSE, THUS LIMITING MISSION LIFE BUT THAT IS ONLY IF A SECOND FAILURE OCCURS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2153 ABORT: 3/3

ITEM: TANK INLET VALVE SWITCH (1)
FAILURE MODE: SINGLE CONTACT OPEN (ELECTRICAL), PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62K0710E

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO OPEN VALVE (FOR OPEN CONTACT) DURING GROUND SERVICING. IF CLOSE VALVE CONTACT IS OPEN, IT IS NOT POSSIBLE TO CLOSE VALVE IN THE EVENT OF A TANK FAILURE. DUE TO SHORT DURATION OF ASCENT, DESCENT AND ABOART CASES, THE EFFECTS WERE CONSIDERED INSIGNIFICANT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2154 ABORT: 3/3

ITEM: TANK INLET VALVE SWITCH (1)
FAILURE MODE: SHORTED SINGLE CONTACT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62K0710E

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
WORST CASE IS SHORT ACROSS CLOSE CONTACT, THUS UNABLE TO OPEN VALVE AND INABILITY TO DO ARS CONDENSATE OR WASTE FLUID STORAGE IN WASTE TANK, MUST USE CONTINGENCY METHODS. DUE TO SHORT DURATION OF ASCENT, DESCENT AND ABORT CASES, THE EFFECTS WERE CONSIDERED INSIGNIFICANT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2155 ABORT: /NA

ITEM: TANK INLET VALVE,SOLENOID (2)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV16

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT UNLESS ANOTHER FAILURE OCCURS. UNABLE TO CLOSE TANK VALVE, REQUIRES USAGE OF CONTINGENCY WASTE COLLECTION METHODS. LOSS OF ARS CONDENSATE STORAGE IF ATTEMPT TO CLOSE VALVE IS DUE TO LOSS OF WASTE TANK 1 STORAGE CAPABILITY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2156 ABORT: /NA

ITEM: TANK INLET VALVE, SOLENOID (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV16

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO CLOSE VALVE IN THE EVENT OF ADDITIONAL FAILURE, BUT NOT EFFECT NORMALLY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2157 ABORT: 3/3

ITEM: WASTE WATER TANK INLET VALVE OPEN INDICATOR (2)
FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV16

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO CHANGE INDICATOR VALUE, MUST RELY ON MULTIPLE TRANSDUCERS FOR VALVE POSITION INDICATION OR VISUAL OBSERVATION OF DUMP.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2158 ABORT: 3/3

ITEM: TANK INLET VALVE INICATOR DIODE (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED, EXCESSIVE RESISTANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: A7CR1

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO DETERMINE VALVE POSITION BY INDICATOR, MUST RELY ON MULTIPLE TRANSDUCERS FOR VALVE STATUS. DUE TO SHORT DURATION OF ASCENT, DESCENT AND ABORT CASES, THE EFFECTS WERE CONSIDERED INSIGNIFICANT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2159 ABORT: 3/3

ITEM: TANK INLET VALVE INICATOR RESISTOR TO MDM OF1 (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED, EXCESSIVE RESISTANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62X0583E (A1R2), 5.1 KOHM

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO DETERMINE VALVE POSITION BY INDICATOR, MUST RELY ON MULTIPLE TRANSDUCERS FOR VALVE STATUS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2160 ABORT: /NA

ITEM: TANK OUTLET VALVE CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO REMAIN CLOSED, PREMATURE OPERATION, OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL ML86B, CB23
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO POWER TO VALVE FOR FLUID DUMP LINE CLEANING DURING GSE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2161 ABORT: /NA

ITEM: TANK OUTLET VALVE CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO OPEN, DELAYED OPERATION

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL ML868, CB23
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
PERMANENT DAMAGE TO VALVE MOTORS, EFFECTS GROUND SERVICING ACTIVITIES.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2162 ABORT: /NA

ITEM: TANK OUTLET VALVE SWITCH (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62K0715E

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT EXCEPT DURING GROUND SERVICING FOR SYSTEM FLUSHING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2163 ABORT: /NA

ITEM: TANK OUTLET VALVE SWITCH (2)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62K0714E

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT EXCEPT DURING GROUND SERVICING FOR SYSTEM FLUSHING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2164 ABORT: /NA

ITEM: TANK OUTLET VALVE, SOLENOID (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV17

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT DURING GROUND SERVICING FOR SYSTEM FLUSHING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2165 ABORT: /NA

ITEM: TANK OUTLET VALVE, SOLENOID (1)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV17

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT EXCEPT DURING GROUND SERVICING FOR SYSTEM FLUSHING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2166 ABORT: 3/3

ITEM: TANK OUTLET VALVE SWITCH INDICATOR
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: CREW MODULE, MIDDECK, AREA 80
PART NUMBER: PANEL ML31C, DS2

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO "TELL-TALE" INDICATION OF VALVE POSITION DURING GROUND SERVICING. SHOULD INDICATE "BARBER-POLE" AT ALL TIMES BECAUSE CIRCUIT BREAKER IS OPEN.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2167 ABORT: 3/3

ITEM: TANK OUTLET VALVE DIODE (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED, EXCESSIVE RESISTANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: A7CR1

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT EXCEPT DURING GROUND SERVICING FOR SYSTEM FLUSHING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2168 ABORT: 3/3

ITEM: TANK OUTLET VALVE RESISTOR TO MDM OF2 (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED, EXCESSIVE RESISTANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62X0580E (A1R1), 5.1 KOHM

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT EXCEPT DURING GROUND SERVICING FOR SYSTEM FLUSHING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2169 ABORT: /NA

ITEM: PRESSURE SENSOR (VARIABLE RESISTANCE BRIDGE) (1)
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62MT21 (V26PO500A TRANSDUCER)

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION, IMPROPER VOLTAGE INPUT

EFFECTS/RATIONALE:
INEFFECTIVE PRESSURE INDICATION, POSSIBLE UNTRACEABLE CABIN PRESSURE LOSS SOURCE IF OTHER MULTIPLE FAILURES OCCUR.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2170 ABORT: /NA

ITEM: PRESSURE SENSOR SIGNAL CONDITIONER (1)
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK AREA 40
PART NUMBER: 40V62A23

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
IMPROPER PRESSURE INDICATION, POSSIBLE UNTRACEABLE CABIN PRESSURE LOSS SOURCE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2171 ABORT: /NA

ITEM: WASTE H2O DUMP ISOL. VALVE CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B
PART NUMBER: CB17 (80V73A130)

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO POWER DUMP ISOLATION VALVE OPEN. LOSS OF ARS CONDENSATE STORAGE, PRODUCES CHANGE IN MISSION SCHEDULE. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2172 ABORT: /NA

ITEM: WASTE H2O DUMP ISOL. VALVE CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B
PART NUMBER: CB17 (80V73A130)

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
POSSIBLE BURN-UP OF VALVE SOLENOID IF SOLENOID DRAWING EXCESS CURRENT, THEREBY PRODUCING NEED TO USE CONTINGENCY WASTE COLLECTION METHODS OR OTHER BACKUP SYSTEMS IF SUBSEQUENT FAILURES OCCUR.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2173 ABORT: /NA

ITEM: WASTE H2O DUMP ISOL. VALVE CIRCUIT BREAKER (1)
FAILURE MODE: SINGLE CONTACT OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62K0530E

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
IMPOSSIBLE TO OPEN DUMP ISOLATION VALVE, NO METHOD OF ALTERNATE WASTE FLUID DUMP OR ARS CONDENSATE STORAGE METHOD BEYOND WASTE TANK. NEED TO USE CONTINGENCY WASTE COLLECTION METHODS. THIS ALLOWS ONLY 3 DAYS OF URINE COLLECTION DEVICES PER CREW MEMBER.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2174 ABORT: /NA

ITEM: WASTE H2O DUMP ISOL. VALVE CIRCUIT BREAKER (1)
FAILURE MODE: SINGLE CONTACT SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62K0530E

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
IMPOSSIBLE TO OPEN VALVE IF OCCURS DURING ASCENT BECAUSE OF BURN-UP OF SOLENOID. NO METHOD OF ARS CONDENSATE STORAGE BEYOND WASTE TANK, CHANGE IN MISSION SCHEDULE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2175 ABORT: /NA

ITEM: WASTE H2O DUMP ISOL. VALVE CIRCUIT BREAKER (1)
FAILURE MODE: PHYSICAL BINDING JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62K0531E

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
IMPOSSIBLE TO OPEN VALVE, NO METHOD OF ALTERNATE WASTE FLUID DUMP OR ARS CONDENSATE STORAGE METHOD BEYOND WASTE TANK CAPACITY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2176 ABORT: /NA

ITEM: WASTE H2O DUMP ISOL. VALVE CIRCUIT BREAKER (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV15

CAUSES: CONTAMINATION, PIECE-PART FAILURE, ELECTROMAGNETIC FIELDS

EFFECTS/RATIONALE:
WORST CASE IS FAILURE OF OPEN ACTUATION IN WHICH CASE CANNOT DO WASTE FLUID DUMPS. MISSION SCHEDULE IMPACT BECAUSE NO ARS CONDENSATE STORAGE OTHER THAN WASTE TANK AND MUST USE CONTINGENCY WASTE COLLECTION METHODS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 2177 ABORT: /NA

ITEM: WASTE H2O DUMP ISOL. VALVE CIRCUIT BREAKER (1)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER: 90V62LV15

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
WORST CASE IS A SHORTED SOLENOID BEFORE ON-ORBIT, THEN WHEN THE CIRCUIT BREAKER IS CLOSED ON-ORBIT TO OPEN THE VALVE - THE CIRCUIT BREAKER "POPS" AND THE VALVE CANNOT BE OPENED. THIS CREATES A LIMITATION OF ARS CONDENSATE AND WASTE FLUID COLLECTION CAPACITY TO THE WASTE TANK 1, THUS LIMITING MISSION LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	8/14/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/3
MDAC ID:	2178	ABORT:	3/3

ITEM: DUMP ISOLATION VALVE INDICATOR DIODE (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORT, EXCESSIVE RESISTANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER STORAGE ASSEMBLY
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: A6CR1

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
ONLY MDM OF2 DISPLAY AVAILABLE FOR VALVE STATUS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2179 ABORT: 3/3

ITEM: DUMP ISOLATION VALVE RESISTOR TO MDM OF2 (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED, EXCESSIVE RESISTANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER STORAGE ASSEMBLY
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62X0534E (A2R1), 5.1 KOHM

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
MDM OF2 VALVE STATUS NON-EXISTENT; MUST RELY ON INDICATOR WINDOW.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2180 ABORT: 3/3

ITEM: WASTE H2O DUMP ISOL. SWITCH INDICATOR (1)
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SUBSYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER STORAGE ASSEMBLY
4) ELECTRICAL PARTS
5) WATER STORAGE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B
PART NUMBER: 80V73A127, INDICATOR DS3

CAUSES: CONTAMINATION, PIECE-PART FAILURE, ELECTROMAGNETIC FIELDS, VIBRATION

EFFECTS/RATIONALE:
INACCURATE INFORMATION ON VALVE STATUS. MUST RELY ON MDM OF2 FOR VALVE STATUS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2181 ABORT: 3/3

ITEM: DUMP LINE HEATER CIRCUIT BREAKER (2)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SUBSYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B
PART NUMBER: 80V73A130, CB4 AND CB10

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
IMPOSSIBLE TO USE ONE OF THE LINE HEATERS IN THE POTABLE AND WASTE FLUID DUMP AND VACUUM VENT DUMP, REQUIRES RELIANCE ON SECOND HEATER FOR SYSTEMS INVOLVED. IF SECOND HEATER FAILS THEN MUST GO TO CONTINGENCY WASTE COLLECTION METHODS OR CONTINGENCY CROSS-TIE USAGE. IF SECOND HEATER CIRCUIT BREAKER FAILS THEN THERE IS A POSSIBILITY OF FREEZING THE VACUUM VENT DUMP LINE AND CREATING A POTENTIALLY EXPLOSIVE HYDROGEN GAS ENVIRONMENT IN THE VACUUM VENT LINE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2182 ABORT: 3/3

ITEM: DUMP LINE HEATER CIRCUIT BREAKER (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B
PART NUMBER: 80V73A130, CB4 AND CB10

CAUSES: CONTAMINATION, PIECE-PART FAILURE, ELECTROMAGNETIC FIELDS

EFFECTS/RATIONALE:
FOR THE CIRCUIT BREAKER "FAILS TO OPEN" FAILURE THERE IS NO MISSION OR VEHICLE IMPACT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2183 ABORT: 3/3

ITEM: DUMP LINE HEATER (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62HR107, 40V62HR207

CAUSES: ACOUSTICS, CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, IONIZING RADIATION, VIBRATION

EFFECTS/RATIONALE:
WITH LOSS OF HEATER, AND IF REDUNDANCY FAILS (SECOND LINE HEATER), THEN MUST USE WASTE WATER CROSS-TIE TO CWC TO DUMP WATER OR USE CONTINGENCY WASTE COLLECTION METHODS. IF THERE IS LINE FREEZING THERE IS POTENTIAL RUPTURE OF LINE, REQUIRING CLOSURE OF DUMP ISOLATION VALVE WHICH HAS A DIRECT IMPACT ON MISSION LIFE DUE TO ARS CONDENSATE STORAGE LIMITATIONS. THERE IS A MISSION IMPACT IF THE CONTINGENCY WASTE COLLECTION METHODS ARE USED, RESTRICTED TO 3 DAYS' SUPPLY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2184 ABORT: /NA

ITEM: DUMP LINE HEATER (2)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62HR107, 40V62HR207

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE CIRCUIT BREAKER "POPS" AND MUST RELY ON THE ALTERNATE HEATER TO PRECLUDE LINE FREEZING. IF THE LINE FREEZES WILL HAVE MISSION LOSS DUE TO EXTERNAL CABIN PRESSURE LEAK.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	7/31/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/3
MDAC ID:	2185	ABORT:	3/3

ITEM: WASTE H2O DUMP HEATER LINE THERMOSTAT (4)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62S107 AND 40V62S207

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, THERMAL SHOCK, ELECTROMAGNETIC FIELDS, VIBRATION

EFFECTS/RATIONALE:
POSSIBLE EXCESSIVE HEATING OF HEATER LINE IF BACKUP THERMOSTAT FAILS TO OPEN. THE UNCONTROLLED HEATER WOULD NORMALLY SET OFF AN FDA ALARM AND IN THE EVENT THE RUNAWAY HEATER WAS NOT ANUNICATED, THE POTENTIAL FOR LINE BOILING OR RUPTURE IS NOT CREDIBLE.
THE HEATER CAN STILL BE CONTROLLED BY THE CIRCUIT BREAKER ALSO.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2186 ABORT: 3/3

ITEM: WASTE H2O DUMP HEATER LINE THERMOSTAT (4)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62S107 AND 40V62S207

CAUSES: CONTAMINATION, PIECE-PART FAILURE, IONIZING RADIATION, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO USE LINE HEATER AND MUST RELY ON ALTERNATE LINE HEATER. THERE IS POTENTIAL FOR LINE FREEZING IF BOTH LINE HEATERS ARE INOPERATIVE AND RUPTURE OF LINE, THUS RESTRICTION OF MISSION DUE TO ARS CONDENSATE STORAGE CAPACITY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2187 ABORT: /NA

ITEM: WASTE H2O DUMP LINE TEMPERATURE TRANSDUCER (1)
(POTENTIAL COMPARATOR)
FAILURE MODE: OUT OF TOLERANCE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62MT20

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION, IMPROPER VOLTAGE INPUT

EFFECTS/RATIONALE:
INACCURATE WASTE WATER DUMP LINE TEMPERATURE INDICATION, POSSIBLE LINE FREEZING IF HEATERS ARE INOPERATIVE. REQUIRES USE OF CONTINGENCY WATER OR CROSS-TIE CONTINGENCY FOR FLUID DUMP TO PROTECT FROM LINE FREEZING.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2188 ABORT: /NA

ITEM: WASTE H2O DUMP LINE TEMPERATURE SIGNAL CONDITIONER
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FORWARD AVIONICS BAY 1, AREA 81
PART NUMBER: 81V754A16

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
INACCURATE INPUT TO LINE TEMPERATURE SENSOR, INACCURATE TEMPERATURE INDICATION. REQUIRES USE OF CONTINGENCY FLUID CONTAINER OR CONTINGENCY CROSS-TIE FOR WASTE FLUID DUMP.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2189 ABORT: /NA

ITEM: DUMP VALVE/NOZZLE HEATER CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B, MIDDECK AREA 80
PART NUMBER: 80V73A130, CB65

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
IMPOSSIBLE TO COMPLETE FLUID DUMP. NEED TO USE CONTINGENCY WATER CONTAINER (CWC). USE CONTINGENCY CROSS-TIE FOR FLUID DUMPS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2190 ABORT: /NA

ITEM: DUMP VALVE/NOZZLE HEATER CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML86B, MIDDECK AREA 80
PART NUMBER: 80V73A130, CB65

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO EFFECT ON MISSION OR VEHICLE UNLESS A SECOND FAILURE; E.G., HEATER OR VALVE SHORT OCCURS, IN WHICH CASE EXCEEDANCE OF SHUTTLE WIRING CAPABILITY IS A POTENTIAL.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2191 ABORT: /NA

ITEM: DUMP VALVE ENABLE/NOZZLE HEATER SWITCH (1)
FAILURE MODE: SINGLE CONTACT SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MIDDECK AREA 80, D&C PANEL ML31C
PART NUMBER: 80V73A127, S8

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
UNABLE TO POWER OFF DUMP VALVE ENABLE/NOZZLE HEATER CIRCUIT IF SHORTED GROUND. THAT "POPS" CIRCUIT BREAKER AND LOSS OF WASTE WATER DUMP CAPABILITY. NEED TO USE CONTINGENCY WATER CONTAINER (CWC). USE CONTINGENCY CROSS-TIE FOR DUMPS, PROBABLY MISSION CONTROL DECISION OF "LOSS OF MISSION".

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2192 ABORT: /NA

ITEM: DUMP VALVE ENABLE/NOZZLE HEATER SWITCH (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MIDDECK AREA 80, D&C PANEL ML31C
PART NUMBER: 80V73A127, S8

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF WASTE WATER DUMP CAPABILITY IF SWITCH HANDLE FAILS IN THE OFF POSITION. USE CONTINGENCY WATER CONTAINER OR CONTINGENCY CROSS-TIE FOR DUMPS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2193 ABORT: /NA

ITEM: DUMP VALVE ENABLE/NOZZLE HEATER SWITCH (1)
FAILURE MODE: SINGLE CONTACT OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MIDDECK AREA 80, D&C PANEL ML31C
PART NUMBER: 80V73A127, S8

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
UNABLE TO POWER UP DUMP VALVE OR TURN NOZZLE HEATERS ON, MUST USE CONTINGENCY DUMP METHOD.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2194 ABORT: /NA

ITEM: DUMP VALVE ENABLE/NOZZLE HEATER INDICATOR (1)
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MIDDECK AREA 80, D&C PANEL ML31C
PART NUMBER: V62S0541E

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, LOSS OF INPUT, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO DETERMINE IF DUMP VALVE/NOZZLE HEATER ARE POWERED EXCEPT BY THE NOZZLE TEMPERATURE INDICATORS. IF ALL REDUNDANCY FAILS THEN LOSS OF DUMP CAPABILITY AND CONTINGENCY WASTE COLLECTION METHODS MUST BE USED.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2195 ABORT: /NA

ITEM: WASTE H2O DUMP VALVE SWITCH (1)
FAILURE MODE: SINGLE CONTACT OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: S4

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO OPEN VALVE OR USE WASTE FLUID DUMP, MUST USE CONTINGENCY WATER CONTAINER OR CONTINGENCY CROSS-TIE CONNECTION TO POTABLE WATER DUMP FOR WASTE WATER DUMP. IF FAILURE OCCURS AT CLOSURE OF VALVE THEN THE DUMP ISOLATION VALVE MUST BE USED TO TERMINATE THE DUMP AND ONLY A SINGLE FAILURE BEYOND THAT WOULD BE REQUIRED TO SUFFER LOSS OF VEHICLE OR LIFE DUE TO CABIN DEPRESSURIZATION.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2196 ABORT: /NA

ITEM: WASTE H2O DUMP VALVE SWITCH (1)
FAILURE MODE: SINGLE CONTACT SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: S4

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO CLOSE DUMP VALVE WHEN S8 SWITCH IS TURNED ON. CABIN PRESSURE LEAK DUMP ISOLATION VALVE FAILS. REQUIRES CONTINGENCY WATER CONTAINER USAGE FOR WASTE FLUID DUMP AND END OF MISSION BECAUSE OF LIMITED ARS CONDENSATE STORAGE CAPABILITY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2197 ABORT: /NA

ITEM: WASTE H2O DUMP VALVE SWITCH (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: S4

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
WORST CASE IF FAILS WHEN VALVE IS OPEN, THEN CANNOT CLOSE AND DUMP ISOLATION VALVE IS SOLE REDUNDANCY BEFORE CABIN PRESSURE LOSS AND POTENTIAL LOSS OF LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2198 ABORT: /NA

ITEM: WASTE H2O DUMP VALVE SOLENOID (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62LV14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
WORST CASE IS IF FAILURE OCCURS DURING DUMP PROCESS AND CANNOT CLOSE VALVE. ONLY SINGLE FAILURE (DUMP ISOLATION VALVE) FROM CABIN DEPRESSURIZATION AND POTENTIAL LOSS OF LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2199 ABORT: /NA

ITEM: WASTE H2O DUMP VALVE SOLENOID (1)
FAILURE MODE: SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62LV14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
UNABLE TO ACTUATE VALVE CLOSURE, CABIN ATMOSPHERE LOSS AND POSSIBLE VEHICLE LOSS IF DUMP ISOLATION VALVE FAILS. WITH ONLY A SINGLE FAILURE (DUMP ISOLATION VALVE) CABIN DEPRESSURIZATION, POTENTIAL LOSS OF LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2200 ABORT: /NA

ITEM: WASTE H2O DUMP VALVE SOLENOID (1)
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62LV14

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
INDICATION OF VALVE OPEN ON MDM OF3, "TELL-TALE" INDICATES CLOSED. MUST RELY ON DUMP LINE PRESSURE SENSOR FOR VERIFICATION OF VALVE STATUS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2201 ABORT: /NA

ITEM: DUMP VALVE INDICATOR RESISTOR TO MDM OF3 (1)
FAILURE MODE: LOSS OF OUTPUT (OPEN (ELECTRICAL), SHORTED, EXCESSIVE RESISTANCE)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: V62X0539E (A2R2) 5.1 KOHM

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
OUT OF RANGE INDICATION ON MDM OF3, MUST RELY ON "TELL-TALE" FOR VALVE STATUS INDICATION.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2202 ABORT: /NA

ITEM: DUMP VALVE INDICATOR DIODE (1)
FAILURE MODE: LOSS OF OUTPUT (OPEN (ELECTRICAL), SHORTED, EXCESSIVE RESISTANCE)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: D&C PANEL ML31C, 80V73A127
PART NUMBER: A6CR2

CAUSES:

EFFECTS/RATIONALE:
FALSE MDM OF3 READING REGARDING VALVE STATUS. MUST RELY ON PRESSURE SENSOR FOR VALVE STATUS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2203 ABORT: /NA

ITEM: DUMP NOZZLE HEATER (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62HRI

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO HEATING OF DUMP NOZZLE, REQUIRES ALTERNATE WASTE COLLECTION/DUMP METHOD.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/31/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2204 ABORT: /NA

ITEM: WASTE H2O DUMP NOZZLE TEMP. TRANSDUCER (2)
FAILURE MODE: ERRONEOUS OUTPUT, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62MT18 AND 40V62MT23

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
ERRONEOUS NOZZLE TEMPERATURE INDICATION, MUST RELY ON ALTERNATE COMPARATOR FOR NOZZLE TEMPERATURE. IF ALTERNATE COMPARATOR FAILS MUST USE CONTINGENCY WASTE DUMP/COLLECTION METHODS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 2205 ABORT: /NA

ITEM: WASTE H2O DUMP NOZZLE SIGNAL CONDITIONER (2)
FAILURE MODE: ERRONEOUS OUTPUT, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40 AND FWD. AVIONICS BAY 3, AREA 83
PART NUMBER: 40V75A23 AND 83V75A18

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF NOZZLE TEMPERATURE READING, MUST RELY ON ALTERNATE GAUGE

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2206 ABORT: /NA

ITEM: DUMP NOZZLE RESISTOR TO MDM OF4 (HEATER STATUS)(1)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) WASTE WATER SUBSYSTEM
4) ELECTRICAL PARTS
5) DUMP LINE ASSEMBLY
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK AREA 80, 80V73A127, PANEL ML31C
PART NUMBER: A3R1 (5.1 KOHM)

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SIGNAL TO MDM OF4 FOR NOZZLE HEATER STATUS. MUST RELY ON THERMAL TRANSDUCERS FOR NOZZLE HEATER OPERATION VERIFICATION.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF, AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2207 ABORT: 1/1

ITEM: CREW MODULE INTERNAL LINE AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) HARDWARE
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
HYDROGEN GAS RELEASE INTO CABIN ATMOSPHERE - LIFE AND VEHICLE THREATENING CONDITION AND CABIN PRESSURE LOSS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2208 ABORT: 1/1

ITEM: INTERNAL LINE AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) HARDWARE
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90 (DOWNSTREAM OF VACUUM VENT ISOLATION VALVE)
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
UNCONTROLLED CABIN PRESSURE LOSS, LIFE AND VEHICLE THREATENING CONDITION.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2209 ABORT: 1/1

ITEM: EXTERNAL LINE AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) HARDWARE
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
POTENTIAL GASEOUS HYDROGEN LEAK INTO CARGO BAY FROM HYDROGEN SEPARATORS. POSSIBLE EXPLOSIVE ATMOSPHERE DURING ASCENT AND DESCENT PRODUCING LOSS OF LIFE AND VEHICLE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60ED, 60EF AND 60EM

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2210 ABORT: 1/1

ITEM: DYNATUBE FITTING AT CREW CABIN WALL (1)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) HARDWARE
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: ECLSS AREA 90
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
CABIN PRESSURE LOSS, PRODUCES LOSS OF MISSION, POSSIBLY LOSS OF LIFE IF DEVELOPED CATASTROPHICALLY.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2211 ABORT: 3/3

ITEM: VACUUM VENT NOZZLE (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) VACUUM VENT NOZZLE
5) HARDWARE
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62TP125

CAUSES: CONTAMINATION, ICE BUILDUP

EFFECTS/RATIONALE:
LOSS OF VACUUM VENT DUMP CAPABILITY, CREATES FES SHUTDOWN DUE TO HYDROGEN GAS CONCENTRATION THUS LIMITING MISSION LIFE. (POTENTIAL EXPLOSIVE HYDROGEN GAS ENVIRONMENT). DUE TO SHORT DURATION OF ASCENT, DESCENT AND ABORT CASES, THE EFFECTS WERE CONSIDERED INSIGNIFICANT.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2212 ABORT: 3/3

ITEM: VACUUM VENT LINE HEATER THERMOSTAT (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62S109 AND 40V62S209

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO PROBLEM LEAVING HEATERS ON 100%.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2213 ABORT: /NA

ITEM: VACUUM VENT LINE HEATER THERMOSTAT (2)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62S109 AND 40V62S209

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

EFFECTS/RATIONALE:
IMPOSSIBLE TO ACTUATE HEATER, SWITCH TO ALTERNATE HEATER LINE. UNABLE TO VACUUM VENT DUMP IF BOTH HEATERS FAIL, WOULD CREATE HYDROGEN SEPARATORS SHUTDOWN BECAUSE OF HYDROGEN GAS CONCENTRATION IN SUPPLY WATER THUS LIMITING MISSION LIFE DUE TO POSSIBLE LINE FREEZING (POSSIBLE EXPLOSIVE HYDROGEN GAS ENVIRONMENT).

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 2214 ABORT: /NA

ITEM: VACUUM VENT LINE HEATER (2)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62HR109, 115, 209

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
REQUIRES SWITCHING TO ALTERNATE HEATER. UNABLE TO VACUUM VENT DUMP IF BOTH HEATERS FAIL, WOULD CREATE HYDROGEN SEPARATOR SHUTDOWN BECAUSE OF HYDROGEN GAS CONCENTRATION IN SUPPLY WATER, THUS LIMITING MISSION LIFE. POTENTIAL LINE FREEZING WITHOUT HEATERS.
FOR SHORTED FAILURE OF THE SUPPLY AND WASTE DUMP HEATERS CAN ALSO BE TURNED OFF BY CIRCIUT BREAKER "POPPNG" OR POTENTIAL EXPLOSIVE HYDROGEN GAS ENVIRONMENT IN VACUUM VENT LINE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2215 ABORT: /NA

ITEM: LINE TEMPERATURE SIGNAL CONDITIONER (1)
FAILURE MODE: ERRONEOUS OUTPUT, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: FORWARD AVIONICS BAY 2, AREA 82
PART NUMBER: 82V75A17

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF VACUUM VENT DUMP TEMPERATURE GAUGE, NO EFFECT ON MISSION. POTENTIAL HYDROGEN SEPARATOR SHUTDOWN AND CONTAMINATION OF SUPPLY WATER BY HYROGEN GAS IF HEATERS FAIL DUE TO LINE FREEZING, BUT THAT IS SECOND NON-REDUNDANT FAILURE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2216 ABORT: 3/3

ITEM: LINE TEMPERATURE SENSOR (1)
FAILURE MODE: ERRONEOUS OUTPUT, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62MT22A

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, LOSS OF INPUT, VIBRATION

EFFECTS/RATIONALE:
LOSS OF VACUUM VENT DUMP CAPABILITY BECAUSE OF THERMAL GAUGE LOSS, NO EFFECT ON MISSION. POTENTIAL HYDROGEN SEPARATOR CONTAMINATION BY HYDROGEN GAS, ONLY IF HEATERS FAIL AND CAUSING REDUCTION OF MISSION LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2217 ABORT: /NA

ITEM: NOZZLE HEATER CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK AREA 80, D&C PANEL ML86B
PART NUMBER: CB66

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
NO PROBLEM WITH HEATER ON 100% OF TIME.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2218 ABORT: /NA

ITEM: NOZZLE HEATER CIRCUIT BREAKER (1)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK AREA 80, D&C PANEL ML86B
PART NUMBER: CB66

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
IMPOSSIBLE TO MAINTAIN NOZZLE TEMPERATURE. POTENTIAL RESTRICTION OF VACCUM VENT DUMPS AND HYDROGEN SEPARATOR SHUTDOWN BECAUSE OF HYDROGEN GAS CONCENTRATION IN SUPPLY WATER, THUS LIMITING MISSION LIFE. (POTENTIAL EXPLOSIVE HYDROGEN GAS ENVIRONMENT)

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2219 ABORT: /NA

ITEM: NOZZLE HEATER SWITCH (1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK AREA 80, D&C PANEL ML31C
PART NUMBER: S9

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
INABILITY TO ACTIVATE NOZZLE HEATERS, NO DUMPS PERMITTED. RESTRICTION OF VACUUM VENT DUMPS CREATES HYDROGEN SEPARATOR SHUTDOWN DUE TO HYDROGEN GAS CONCENTRATION IN SUPPLY WATER, THUS LIMITING MISSION LIFE. (POTENTIAL EXPLOSIVE HYDROGEN GAS ENVIRONMENT)

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2220 ABORT: /NA

ITEM: NOZZLE HEATER SWITCH (1)
FAILURE MODE: SHORTED CLOSED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK AREA 80, D&C PANEL ML31C
PART NUMBER: S9

CAUSES: ND

EFFECTS/RATIONALE:
REQUIRED TO OPERATE HEATER WITH CIRCUIT BREAKER UNLESS SHORT TO GROUND AND THUS NO POWER TO NOZZLE HEATER. IF CIRCUIT BREAKER FAILS, WOULD LIMIT VACUUM VENT DUMPS AND CREATE POTENTIAL HYDROGEN SEPARATOR SHUTDOWN DUE TO HYDROGEN GAS CONCENTRATION IN SUPPLY WATER, THUS LIMITING MISSION LIFE. (POTENTIAL EXPLOSIVE HYDROGEN GAS ENVIRONMENT IN VACUUM VENT LINE)

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2221 ABORT: /NA

ITEM: RESISTOR TO MDM OF4 (HEATER INDICATOR)(1)
FAILURE MODE: LOSS OF OUTPUT (OPEN, SHORT)

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID DECK AREA 80, 80V73A127, PANEL ML31C
PART NUMBER: A3R2 (5.1 KOHM)

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO "HEATER ON/OFF" INDICATION. USE TEMPERATURE TRANSDUCER AS VERIFICATION OF HEATER STATUS.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 2222 ABORT: /NA

ITEM: VACUUM VENT NOZZLE HEATER (1)
FAILURE MODE: OPEN (ELECTRICAL), SHORT

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62HR9

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:
LOSS OF DUMP CAPABILITY, RESTRICTED VACUUM VENT DUMPS AND CREATES ENVIRONMENT FOR HYDROGEN SEPARATOR SHUTDOWN BECAUSE OF HYDROGEN GAS CONCENTRATION IN SUPPLY WATER, THUS LIMITING MISSION LIFE. POTENTIAL EXPLOSIVE HYDROGEN GAS ENVIRONMENT IN VACUUM VENT LINE. IN CASE OF SHORT TO GROUND, THE CIRCUIT BREAKER IS POPPED, POTENTIAL LOSS OF LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2223 ABORT: /NA

ITEM: NOZZLE TEMPERATURE SENSOR (1)
FAILURE MODE: ERRONEOUS OUTPUT, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62MT19

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, LOSS OF INPUT, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SENSOR OUTPUT, NO EFFECT ON HEATER FUNCTION.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/14/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 2224 ABORT: /NA

ITEM: NOZZLE TEMPERATURE SENSOR CONDITIONER (1)
FAILURE MODE: ERRONEOUS OUTPUT, OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: K. BARICKMAN SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) WASTE MANAGEMENT SUBSYSTEM
3) VACUUM VENT SUBSYSTEM
4) ELECTRICAL PARTS
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MID BODY AREA 40
PART NUMBER: 40V62A23

CAUSES: CONTAMINATION, PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF TEMPERATURE SENSOR, NO EFFECT ON MISSION OR LIFE.

REFERENCES: 1) RI DRAWING VS70-623201; 2) SPACE SHUTTLE SYSTEM HANDBOOK, DRAWING NO. 6.5; 3) RI INTEGRATED SCHEMATIC HANDBOOK, VS70-960102, PAGE 60EC

C.3

SMOKE DETECTION/FIRE SUPPRESSION SUBSYSTEM

Analysis Worksheets

SMOKE DETECTION AND FIRE SUPPRESSION SUBSYSTEMS

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
3001 (*)	2/1R	2/1R	P N P	CB, SMOKE DETN (3)
3002	3/3	3/3		CB, SMOKE DETN (3)
3003 (*)	2/1R	2/1R	P N P	CB, SMOKE DETN (1)
3004	3/3	3/3		CB, SMOKE DETN (1)
3005 (*)	2/1R	2/1R	P N P	CB, SMOKE DETN CABIN (1)
3006	3/3	3/3		CB, SMOKE DETN CABIN (1)
3007 (*)	1/1	1/1		CB, FIRE SUPPRESSION (3)
3008	3/3	3/3		CB, FIRE SUPPRESSION (3)
3009	3/3	3/3		RESISTOR (3)
3010	3/3	3/3		RESISTOR (3)
3011 (*)	2/2	/NA		SW, SMOKE DETN SENSOR RESET (1)
3012 (*)	2/2	3/3		SW, SMOKE DETN SENSOR RESET (1)
3013	3/3	3/3		SW, SMOKE DETN CIRCUIT TEST (1)
3014 (*)	2/2	3/3		SW, SMOKE DETN CIRCUIT TEST (1)
3015	3/3	3/3		FIRE SUPPR PRESSURE SENSOR (3)
3016	3/3	3/3		FIRE SUPPR PRESSURE SENSOR (3)
3017 (*)	2/2	3/3		DIODE (3)
3018	3/3	3/3		DIODE (3)
3019	3/3	3/3		DIODE (3)
3020	3/3	3/3		DIODE (3)
3021	3/3	3/3		RESISTOR (1)
3022	3/3	3/3		RESISTOR (1)
3023	3/3	3/3		RESISTOR (9)
3024	3/1R	3/1R	P P P	RESISTOR (8)
3025 (*)	2/1R	2/1R	P P P	RESISTOR (1)
3026	3/3	3/3		RESISTOR (9)
3027	3/1R	3/1R	P P P	RESISTOR (9)
3028	3/1R	3/1R	P P P	RESISTOR (8)
3029 (*)	2/1R	2/1R	P P P	RESISTOR A1R1 (1)
3030	3/1R	3/1R	P P P	DIODE (11)
3031	3/3	3/3		DIODE (11)
3032	3/1R	3/1R	P P P	DIODE (9)
3033	3/3	3/3		RESISTOR A6R11, R12 (2)
3034	3/1R	2/1R	P P P	RESISTOR A6R11, R12 (2)
3035	3/1R	3/1R	P P P	RESISTOR A6R11, R12 (2)
3036	3/1R	3/1R	P P P	DIODE A6CR1, CR2 (2)
3037	3/3	3/3		DIODE A6CR1, CR2 (2)
3038	3/3	3/3		RESISTOR A1R6, R7 (2)
3039	3/1R	3/1R	P P P	RESISTOR A1R6, R7 (2)
3040	3/3	3/3		ANNUNCIATOR CNTRL ASSY (2)

(*) Potential Critical Items.

SMOKE DETECTION AND FIRE SUPPRESSION SUBSYSTEMS (concluded)

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
3041	3/3	3/3		ANNUNCIATOR CNTRL ASSY (2)
3042	3/1R	3/1R	P P P	SMOKE DETN LIGHT MATRIX-LAMPS
3043	3/1R	3/1R	P P P	C&W ELECTRONICS UNIT SIREN (2)
3044 (*)	1/1	1/1	P P P	SWITCH-FIRE SUPPR AV BAY (3)
3045	3/3	3/3		RESISTOR (2.2K) (3)
3046 (*)	1/1	1/1	P P P	RESISTOR (2.2K) (3)
3047	3/3	3/3		RESISTOR (1.8K) (3)
3048 (*)	1/1	1/1	P P P	SW, FIRE SUPPR AV BAY DISCH (3)
3049	3/3	3/3		LIGHT, FIRE SUPPR BAY DISCH (3)
3050	3/3	3/3		ANNUNCIATOR CNTRL ASSY (1)
3051	3/3	3/3		ANNUNCIATOR CNTRL ASSY (1)
3052 (*)	1/1	1/1	P P P	DIODE (3)
3053	3/3	3/3		DIODE (3)
3054	3/3	3/3		DIODE (3)
3055	3/3	3/3		RESISTOR (3)
3056 (*)	1/1	1/1	P P P	PYRO CONTROLLER (3)
3057 (*)	2/2	2/2		PYRO CONTROLLER (3)
3058 (*)	2/1R	2/1R	P P P	SMOKE DETECTOR (9)
3059 (*)	2/2	2/2		FIRE SUPPRESSANT ASSEMBLY (9)
3060 (*)	1/1	1/1	P F P	FIRE SUPPRESSANT ASSEMBLY (9)
3061	3/3	3/3		PORT FIRE SUPPRESSANT ASSY (1)
3062	3/1R	/NA	P P P	PORT FIRE SUPPRESSANT ASSY (1)
3063	3/3	3/3		HYBRID DRIVER (TYPE III) (3)
3064	3/3	3/3		HYBRID DRIVER (TYPE I) (3)
3065 (*)	1/1	1/1	P P P	HYBRID DRIVER (TYPE II) (3)

(*) Potential Critical Items.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 3001 ABORT: 2/1R

ITEM: CB-SMOKE DETN BAY 2A/3B, 1B/3A, 1A/2B (CB8, 7, 7)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) CIRCUIT BREAKERS CB8 (MNA), CB7 (MNB), CB7 (MNC)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL 014, 015, 016
PART NUMBER: 33V73A14, A15, A16

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF ONE SMOKE DETN BAY CIRCUIT BREAKER RESULTS IN THE LOSS OF REDUNDANT SENSING WITHIN TWO (2) A/V BAYS. WITH NO OTHER SYSTEM FAILURES THE FIRE WILL BE SENSED BY THE REMAINING (REDUNDANT) SENSOR. THE ABILITY OF THE CREW TO SENSE A FIRE WOULD BE MOST DIFFICULT BECAUSE THE AIR CIRCULATION IS RESTRICTED WITHIN THE BAY AND ONCE IT ESCAPES IT MUST CIRCULATE THROUGHOUT THE CABIN TO BE DETECTED. LOSS OF FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE. SCREEN B IS NOT APPLICABLE DUE TO RULE 2.3.4.b.2.a (pg 2-12) OF SPECIFICATION NSTS-22206.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3002 ABORT: 3/3

ITEM: CB-SMOKE DETN BAY 2A/3B, 1B/3A, 1A/2B (CB8, 7, 7)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) CIRCUIT BREAKERS CB8 (MNA), CB7 (MNB), CB7 (MNC)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL 014, 015, 016
PART NUMBER: 33V73A14, A15, A16

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT SINCE THE NOMINAL POSITION FOR ALL FLIGHT PHASES IS CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 3003 ABORT: 2/1R

ITEM: CB-SMOKE DETN L/R FLT DECK (CB7)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) CIRCUIT BREAKER CB7 (MNA)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL 014
PART NUMBER: 33V73A14

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF THIS CIRCUIT BREAKER RESULTS IN THE LOSS OF REDUNDANT SENSING IN THE CREW COMPARTMENT. LAG IN WITH NO OTHER SYSTEM FAILURES A FIRE WILL BE SENSED BY THE CABIN SENSOR. DETECTION OF THE IGNITION SOURCE REQUIRES THE CREW TO USE SIGHT, TOUCH, AND SMELL. A SIGNIFICANT LAG IN LOCATING THE IGNITION SOURCE COULD BE EXPERIENCED SINCE NO LEFT/RIGHT ISOLATION INDICATION IS AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3004 ABORT: 3/3

ITEM: CB-SMOKE DETN L/R FLT DECK (CB7)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) CIRCUIT BREAKER CB7 (MNA)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL 014
PART NUMBER: 33V73A14

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT SINCE THE NOMINAL POSITION FOR ALL FLIGHT PHASES IS CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 3005 ABORT: 2/1R

ITEM: CB-SMOKE DETN CABIN (CB6)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) CIRCUIT BREAKER CB6 (MNC)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL 016
PART NUMBER: 33V73A16

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF THIS CIRCUIT BREAKER RESULTS IN THE LOSS OF THE SENSING UNIT IN THE CREW COMPARTMENT. WITH NO OTHER SYSTEM FAILURES A FIRE WOULD BE SENSED BY THE LEFT AND/OR RIGHT FLIGHT DECK SENSORS. DETECTION OF THE IGNITION SOURCE REQUIRES THE CREW TO USE SIGHT, TOUCH AND SMELL. THE ORDER IN WHICH THE SENSORS TRIGGER AND CONCENTRATION LEVELS SHOULD PROVIDE INSIGHT TO LEFT/RIGHT ISOLATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3006 ABORT: 3/3

ITEM: CB-SMOKE DETN CABIN (CB6)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) CIRCUIT BREAKER CB6 (MNC)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL 016
PART NUMBER: 33V73A16

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT SINCE THE NOMINAL POSITION FOR ALL FLIGHT PHASES IS CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 3007 ABORT: 1/1

ITEM: CB-FIRE SUPPR, BAY 1, 2, 3 (CB8, 8, 9)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) POWER
4) CIRCUIT BREAKER CB8 (MNB), CB8 (MNC), CB9 (MNA)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL 015, 016, 014
PART NUMBER: 33V73A14, A15, A16

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF A CIRCUIT BREAKER RESULTS IN THE LOSS OF THE CAPABILITY TO DISPENSE THE SUPPRESANT FROM THE PERMANENTLY MOUNTED BOTTLE IN THE ASSOCIATED AVIONICS BAY. IN THE PRELAUNCH, ON ORBIT, AND LANDING/SAFING PHASES BACKUP PORTABLE FIRE EXTINGUISHERS ARE AVAILABLE FOR USE TO EXTINGUISH THE FIRE. IN ALL OTHER PHASES, CREW MOVEMENT IS RESTRICTED THEREFORE THE PORTABLE EXTINGUISHERS ARE INACCESSIBLE, AND THERE IS A POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3008 ABORT: 3/3

ITEM: CB-FIRE SUPPR BAY 1, 2, 3 (CB8, 8, 9)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) POWER
4) CIRCUIT BREAKER CB8 (MNB), CB8 (MNC), CB9 (MNA)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL 015, 016, 014
PART NUMBER: 33V73A14, A15, A16

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT SINCE THE NOMINAL POSITION FOR ALL FLIGHT PHASES IS CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3009 ABORT: 3/3

ITEM: RESISTOR-A2R1, A2R2, A2R3 (5.1K)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) FIRE SUPPRESSION-ANNUNCIATION
5) RESISTOR-ISOLATION (AGENT DISCH LT)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT ON SMOKE DETECTION SYSTEM, ALL SENSORS WORK NOMINALLY. FAILURE RESULTS IN THE INABILITY TO ILLUMINATE THE ASSOCIATED AGENT DISCH LIGHT DURING AN ACTUAL ACTIVATION (SUPPRESSANT DISCHARGED) OR DURING A TEST. DISCHARGE OF THE SUPPRESSANT CAN BE SENSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3010 ABORT: 3/3

ITEM: RESISTOR-A2R1, A2R2, A2R3 (5.1K)
FAILURE MODE: SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) POWER
4) FIRE SUPPRESSION-ANNUNCIATION
5) RESISTOR-ISOLATION (AGENT DISCH LT)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
DISCHARGE LIGHT FAILS TO OPERATE DURING AN ACTUAL ACTIVATION (FIRE SUPPRESSANT IS DISCHARGED). IN ADDITION, THE CIRCUIT BREAKER WILL OPEN DUE TO THE OVERCURRENT CONDITION (SEE MDAC ID 3001, 3003, 3005 FOR THE EFFECTS OF THE OPEN CIRCUIT BREAKER).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 3011 ABORT: /NA

ITEM: SW-SMOKE DETECTION SENSOR RESET (S7)
FAILURE MODE: PHYSICAL BINDING/JAMMING, OPEN (ELECTRICAL), FAILS TO SWITCH, JAMMED IN MAINTAINED POSITION

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) RESET
4) SWITCH
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SMOKE DETECTOR RESET CAPABILITY FOR ANY SENSOR THAT HAS BEEN TRIGGERED (L+3HR). THIS RESULTS IN THE LOSS OF THE SENSOR CAPABILITY TO ANNUNCIATE A FIRE. THIS MEANS REDUNDANT ANNUNCIATION IS LOST, BUT THE SMOKE CONCENTRATION INDICATION IS STILL
AVAILABLE FROM EACH SENSOR. ONE CONTACT FAILING TO CLOSE IS A SUBSET WHICH RESULTS IN THE LOSS OF TWO (2), THREE (3), OR FOUR (4) SENSORS. THE CONCENTRATION PARAMETER IS A FAULT DETECTION OF ANNUNCIATION (FDA) ITEM. IF POSSIBLE, THE CALCULATION OF THE RATE OF CHANGE SHOULD ALSO BE DEVELOPED AND INCLUDED IN THE FDA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 3012 ABORT: 3/3

ITEM: SW-SMOKE DETECTION SENSOR RESET (S7)
FAILURE MODE: SHORTED, ONE CONTACT FAILS TO OPEN AFTER CLOSURE

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) RESET
4) SWITCH
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
PROVIDES A CONTINUOUS RESET SIGNAL TO TWO (2), THREE (3), OR FOUR (4) SMOKE DETECTORS, DISABLING THE SENSORS CAPABILITY TO ANNUNCIATE A FIRE. THIS MEAN SOME REDUNDANT ANNUNCIATION IS LOST, BUT THE SMOKE CONCENTRATION INDICATION IS STILL AVAILABLE FROM EACH SENSOR THROUGH THE FDA AND CRT'S. IF POSSIBLE, THE CALCULATION OF THE RATE OF CHANGE SHOULD ALSO BE DEVELOPED AND INCLUDED IN THE FDA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3013 ABORT: 3/3

ITEM: SW-SMOKE DETECTION CIRCUIT TEST (S8)
FAILURE MODE: SHORTED, FAILS TO SWITCH, JAMMED IN OFF POSITION

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) TEST FUNCTION
4) FIRE SUPPRESSION-ANNUNCIATION
5) SWITCH
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SMOKE DETECTOR TEST CAPABILITY. NOMINALLY ONE IS PERFORMED AT L+3H TO PROVIDE EMERGENCY SYSTEM CONFIDENCE IN THE SENSOR ELECTRONICS. LOSS OF CAPABILITY TO CHECKOUT AGENT DISCH LIGHTS. IN CASE OF A FIRE THE AGENT DISCH FUNCTION IS UNAFFECTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 3014

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

ITEM: SW-SMOKE DETECTION CIRCUIT TEST (S8)
FAILURE MODE: PHYSICAL BINDING/JAMMING, FAILS TO SWITCH, SHORTED, FAILED IN A OR B POSITION ONE CONTACT OR ALL

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) TEST FUNCTION
4) FIRE SUPPRESSION-ANNUNCIATION
5) SWITCH (S8)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ONE LEG OF S/F LEG OF REDUNDANCY. FOUR (4) OR FIVE (5) SENSOR (POSITION B OR A) ARE MAINTAINED IN A TEST CONDITION AND ANY ALARM SIGNAL WILL NOT TRIGGER THE MASTER ALARM OR SIREN. SMOKE CONCENTRATION LEVELS ARE STILL AVAILABLE FOR ALL SENSORS. THE AGENT DISCH LTS WILL BE ILLUMINATED AND THEREFORE WILL NOT PROVIDE AN INDICATION OF SUPPRESSANT DISCHARGE IF COMMANDED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3015 ABORT: 3/3

ITEM: FIRE SUPPRESSANT PRESSURE SENSOR
FAILURE MODE: FAILS TO OUTPUT

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) ANNUNCIATION
4) FIRE SUPPRESSANT ASSEMBLY
5) PRESSURE SENSOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AVIONICS BAY 1, 2, AND 3; AREA 81, 82, AND 83
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
RESULTS IN NO AGENT DISCH LIGHT INDICATION UPON DISCHARGE OF A BOTTLE. THE DETECTOR CONCENTRATION LEVEL AND CREW SENSES WILL PROVIDE INSIGHT TO AGENT DISCHARGE.

AFFECTED BAY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3016 ABORT: 3/3

ITEM: FIRE SUPPRESSANT PRESSURE SENSOR
FAILURE MODE: PREMATURE OPERATION, ERRONEOUS OUTPUT

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) ANNUNCIATION
4) FIRE SUPPRESSANT ASSEMBLY
5) PRESSURE SENSOR
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AVIONICS BAY 1, 2, AND 3; AREA 81, 82, AND 83
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
PROVIDES A FALSE INDICATION OF FIRE SUPPRESSANT DISCHARGE. AFTER VERIFICATION OF FALSE INDICATION, A SUBSEQUENT REQUIREMENT TO DISCHARGE THE BOTTLE COULD BE MONITORED VIA OTHER MEANS (PIC CAP VOLTAGE, CONCENTRATION LEVEL CHANGES, CREW SENSES).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 3017 ABORT: 3/3

ITEM: DIODE-A4CR1, A4CR2, A4CR3
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) RESET
4) DIODE-ISOLATION (PRE FLT BUS RESET)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SMOKE DETECTOR RESET CAPABILITY FOR TWO (2), THREE (3), OR FOUR (4) SENSORS (A4CR2, CR3, OR CR1), IF THEY HAVE BEEN TRIGGERED. THIS RESULTS IN THE LOSS OF THE SENSOR CAPABILITY TO ANNUNCIATE A FIRE. THIS CASE CAN EXIST AFTER A TEST IS PERFORMED (L+3HR) AND REDUNDANT ANNUNCIATION IS LOST. SMOKE CONCENTRATION IS STILL AVAILABLE AS AN OUTPUT TO THE FDA AND CRT'S. MISSION TERMINATION SHOULD BE CONSIDERED BECAUSE THE NEXT FAILURE HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE DUE TO THE INABILITY TO ANNUNCIATE AN INCIPIENT FIRE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3018 ABORT: 3/3

ITEM: DIODE-A4CR1, A4CR2, A4CR3
FAILURE MODE: SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) RESET
4) DIODE-ISOLATION (PRE FLT BUS RESET)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, TEMPERATURE, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT, ISOLATION OF THE THREE SMOKE DETECTOR RESET CIRCUITS IS MAINTAINED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3019 ABORT: 3/3

ITEM: DIODE-A3CR1, A3CR2, A3CR3
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) PRE FIT BUS RESET
4) DIODE-ISOLATION (ONBOARD RESET)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, TEMPERATURE, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT, ISOLATION OF THE THREE SMOKE DETECTOR RESET CIRCUITS IS MAINTAINED. SUBSEQUENT ATTEMPTS TO RESET FROM THE PREFLIGHT BUS DURING VEHICLE TURNAROUND WILL EXPOSE THE FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3020 ABORT: 3/3

ITEM: DIODE-A3CR1, A3CR2, A3CR3
FAILURE MODE: SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) PRE FIT BUS RESET
4) DIODE-ISOLATION (ONBOARD RESET)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, TEMPERATURE, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT, IF THE RESET SWITCH IS CLOSED A MOMENTARY CONNECTION OF MAIN BUSES OCCURS BUT EACH CIRCUIT HAS A THREE (3) AMP CIRCUIT BREAKER TO PROTECT THE BUSES IF A SHORT TO GROUND EXISTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3021 ABORT: 3/3

ITEM: RESISTOR-A1R12
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) TEST POWER
4) DIODE-ISOLATION (CNTL BC3 CURRENT LIMIT)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, TEMPERATURE, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SMOKE DETECTOR TEST CAPABILITY, NO OTHER IMPACT. NOMINALLY A TEST IS PERFORMED AT L+3H TO PROVIDE EMERGENCY SYSTEM CONFIDENCE IN THE SENSOR ELECTRONICS. ACTUAL CAPABILITY FOR SMOKE DETECTION AND FIRE SUPPRESSION IS NOT AFFECTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3022 ABORT: 3/3

ITEM: RESISTOR-A1R12
FAILURE MODE: SHORTED, SHORTED TO GROUND

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) TEST POWER
4) DIODE-ISOLATION (CNTL BC3 CURRENT LIMIT)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, TEMPERATURE, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SMOKE DETECTOR TEST CAPABILITY, NO OTHER IMPACTS. NOMINALLY A TEST IS PERFORMED AT L+3H TO PROVIDE EMERGENCY SYSTEM CONFIDENCE IN THE SENSOR ELECTRONICS. ACTUAL CAPABILITY FOR SMOKE DETECTION AND FIRE SUPPRESSION IS NOT AFFECTED. POSSIBLE LOSS OF CNTL BC3 (SEE EPD&C FMEA).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3023 ABORT: 3/3

ITEM: RESISTOR A6R2, R4, R6, R8, R10, R14, R16, R18, R20 (5.1K)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) STATUS INDICATION
4) RESISTOR-ISOLATION (SMOKE DETN TM EXCEPT PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SMOKE DETECTOR TELEMETRY ALARM DISCRETE SIGNAL. THE ONBOARD SYSTEM IS UNAFFECTED AND ANNUNCIATES NORMALLY ANY FIRE SITUATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3024 ABORT: 3/1R

ITEM: RESISTOR A6R4, R6, R8, R10, R14, R16, R18, R20 (5.1K)
FAILURE MODE: SHORTED, SHORTED TO GROUND

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) STATUS INDICATION
4) RESISTOR-ISOLATION (SMOKE DETN TM EXCEPT PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THE GROUNDED RESISTOR WILL DRAW HIGH CURRENTS NOT ALLOWING THE C&W TO ALARM DURING AN INCIPIENT FIRE. THIS RENDERS ONE LEG OF REDUNDANCY INOPERABLE. THE SMOKE CONCENTRATION FDA WILL OPERATE AND THE REDUNDANT SMOKE DETECTOR WORKS. HOWEVER, LOSS OF LIKE AND UNLIKE REDUNDANCIES HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 3025 ABORT: 2/1R

ITEM: RESISTOR A6R2 (CABIN)
FAILURE MODE: SHORTED, SHORTED TO GROUND

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) STATUS INDICATION
4) RESISTOR-ISOLATION (CABIN SMOKE DETECTOR)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF CABIN SMOKE DETECTOR C&W. THE FLIGHT DECK DETECTORS HAVE ONLY THE SMOKE CONCENTRATION FDA TO ALERT THEM OF AN INCIPIENT FIRE. LOSS OF REDUNDANCY (UNLIKE) HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3026 ABORT: 3/3

ITEM: RESISTOR A6R1, R3, R5, R7, R9, R13, R15, R17, R19 (12K)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED, SHORTED TO GROUND

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) STATUS INDICATION
4) RESISTOR-ISOLATION (CABIN SMOKE DETECTOR)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THE TELEMETRY ALARM DISCRETE SIGNAL IS EITHER LOST OR BIASED. THE ONBOARD SYSTEM IS UNAFFECTED AND REACTS NORMALLY TO ANY FIRE SITUATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3027 ABORT: 3/1R

ITEM: RESISTOR A1R1, R2, R3, R4, R5, R8, R9, R10, R11 (1.2K)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) SIREN INPUT
4) RESISTOR-ISOLATION (SMOKE DETN SIREN)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ONE SMOKE DETECTOR MASTER ALARM/SIREN INDICATION. THE REDUNDANT STATUS LIGHT INDICATION WILL STILL ILLUMINATE. SMOKE CONCENTRATION ALARM, TELEMETRY INDICATION, AND CABIN DISPLAY ARE STILL AVAILABLE. LOSS OF FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3028 ABORT: 3/1R

ITEM: RESISTOR A1R2, R3, R4, R5, R8, R9, R10, R11 (1.2K)
FAILURE MODE: SHORTED, SHORTED TO GROUND

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) SIREN INPUT
4) RESISTOR-ISOLATION (SMOKE DETN SIREN)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:
THE GROUNDED RESISTOR WILL DRAW A HIGH CURRENT NOT ALLOWING STATUS LIGHT INDICATION OR THE C&W TO ALARM DURING AN INCIPIENT FIRE. THIS RENDERS ONE LEG OF REDUNDANCY INOPERABLE. THE SMOKE CONCENTRATION FDA WILL OPERATE AND THE REDUNDANT SMOKE DETECTOR WORKS. HOWEVER, LOSS OF LIKE AND UNLIKE REDUNDANCIES HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 3029 ABORT: 2/1R

ITEM: RESISTOR A1R1
FAILURE MODE: SHORTED, SHORTED TO GROUND

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) SIREN INPUT
4) RESISTOR-CABIN C&W
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF CABIN SMOKE DETECTOR C&W. THE FLIGHT DECK DETECTORS HAVE ONLY THE SMOKE CONCENTRATION FDA TO ALERT THEM OF AN INCIPIENT FIRE. LOSS OF REDUNDANCY (UNLIKE) HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3030 ABORT: 3/1R

ITEM: DIODE A1CR1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) SIREN INPUT
4) DIODE-ISOLATION (SMOKE DETN SIREN)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ONE SMOKE DETECTOR MASTER ALARM/SIREN INDICATION. THE ASSOCIATED STATUS LIGHT INDICATION WILL STILL ILLUMINATE AND THE SENSOR CONCENTRATION PARAMETER IS AVAILABLE. LOSS OF FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3031 ABORT: 3/3

ITEM: DIODE A1CR1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
FAILURE MODE: SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) SIREN INPUT
4) DIODE-ISOLATION (SMOKE DETN SIREN)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
GROUNDED DIODE HAS NO EFFECT. THE ALARM WILL WORK IF A SIGNAL IS SENT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	9/22/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/1R
MDAC ID:	3032	ABORT:	3/1R

ITEM: DIODE A1CR1, 2, 3, 4, 5, 8, 9, 10, 11
FAILURE MODE: SHORTED TO GROUND

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) STATUS INDICATION
4) DIODE-ISOLATION
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
SIREN AND LIGHTS WILL NOT WORK FOR FAILED DIODE SEGMENT OR ANY OTHER SEGMENT IN SERIES WITH THIS ONE (A1CR1, 2, 3, 4, 5, 6 WITH TONE A, AND A1CR7, 8, 9, 10, 11 WITH TONE B). REDUNDANT SENSORS ARE ANNUNCIATED WITH DIFFERENT TONES. LOSS OF FUNCTION MAY LEAD TO LOSS OF LIFE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3033 ABORT: 3/3

ITEM: RESISTOR A6R11, R12 (1.2K)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) LIGHT INPUT
4) RESISTOR-ISOLATION (SMOKE DETN LT-PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL L1A1
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF REDUNDANT SIGNAL TO ILLUMINATE THE PAYLOAD LIGHT (PNL L1A1). THE MASTER ALARM/SIREN INDICATION IS UNAFFECTED AND THE REDUNDANT SIGNAL SHOULD ILLUMINATE THE LIGHT. THE PANEL R7 LIGHT AND TELEMETRY SIGNAL ARE UNAFFECTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3034 ABORT: 2/1R

ITEM: RESISTOR A6R11, R12 (1.2K)
FAILURE MODE: SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) LIGHT INPUT
4) RESISTOR-ISOLATION (SMOKE DETN LIGHT-PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER: 31V73A1A1

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF REDUNDANT SIGNAL TO ACTIVATE THE MASTER ALARM AND SIREN CIRCUITS AND TO ILLUMINATE THE PAYLOAD LIGHT. IF EITHER A6R11 OR A6R12 SHORT, THE MOST PROBABLE EFFECT WILL BE THE LOSS OF THE AMPLIFIER 30V73A17 IN ACA NO. 2 AND LOSS OF PAYLOAD ANNUNCIATION IN THE CABIN PANEL (L1A1). LOSS OF LIKE AND UNLIKE REDUNDANCY HAS THE POTENTIAL FOR LOSS OF LIFE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3035 ABORT: 3/1R

ITEM: RESISTOR A6R11, R12 (1.2K)
FAILURE MODE: SHORT TO GROUND

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) LIGHT INPUT
4) RESISTOR
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO INDICATION OF FIRE WILL OCCUR. THE GROUNDED RESISTOR WILL DRAIN THE SYSTEM WHICH IS ACTIVATED BY THE SMOKE ALARM. REDUNDANT SIGNAL (DIFFERENT LEG) WILL ACTIVATE THE FIRE ALARM. LOSS OF FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3036 ABORT: 3/1R

ITEM: DIODE A6CR1, CR2
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) LIGHT INPUT
4) DIODE-ISOLATION (SMOKE DETN LIGHT-PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF REDUNDANT SIGNAL TO ILLUMINATE THE PAYLOAD LIGHT (PNL L1A1). THE MASTER ALARM/SIREN INDICATION IS UNAFFECTED AND THE REDUNDANT SIGNAL SHOULD ILLUMINATE. LOSS OF LIKE AND UNLIKE REDUNDANCY HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3037 ABORT: 3/3

ITEM: DIODE A6CR1, CR2
FAILURE MODE: SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) LIGHT INPUT
4) DIODE-ISOLATION (SMOKE DETN LIGHT-PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT CIRCUIT OPERATES AS IF NO FAILURE EXISTS. CIRCUIT A/B ISOLATION IS LOST.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3038 ABORT: 3/3

ITEM: RESISTOR A1R6, R7 (12K)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) ALARM INPUT
4) RESISTOR-BLEED (SMOKE DETN LIGHT AND SIREN PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
NO MAJOR EFFECT. THE RESISTOR IS USED TO HOLD SMALL VOLTAGE SIGNALS TO ZERO WHEN THE SENSORS ARE NOT INDICATING FIRE. POSSIBILITIES COULD EXIST FOR NUISANCE TRIGGERS OF THE SYSTEM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3039 ABORT: 3/1R

ITEM: RESISTOR A1R6, R7 (12K)
FAILURE MODE: SHORTED, SHORTED TO GROUND

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) ALARM INPUT
4) RESISTOR-BLEED (SMOKE DETN LIGHT AND SIREN PAYLOAD)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
NO INDICATION OF FIRE WILL OCCUR. THE GROUNDED RESISTOR WILL DRAIN THE SYSTEM WHICH IS ACTIVATED BY THE SMOKE ALARM. THE REDUNDANT SIGNAL (DIFFERENT LEG) WILL ACTIVATE THE FIRE ALARM. LOSS OF FUNCTION MAY LEAD TO A FIRE WITH A POTENTIAL FOR LOSS OF LIFE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3040 ABORT: 3/3

ITEM: ANNUNCIATOR CONTROL ASSEMBLY (ACA) 1 AND 2
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) ACA
4) LAMP DRIVER (SMOKE DETN LTS)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AREA 30
PART NUMBER: 36V73A16, 17

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

EFFECTS/RATIONALE:
LOSS OF FIRE SENSOR LIGHT INDICATION. UPON AN ALARM, THE SENSOR OUTPUT CAN BE VERIFIED BY MONITORING THE CONCENTRATION PARAMETER READOUTS ON THE CRT DISPLAY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3041 ABORT: 3/3

ITEM: ANNUNCIATOR CONTROL ASSEMBLY (ACA) 1 AND 2
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) ACA
4) LAMP DRIVER (SMOKE DETN LTS)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AREA 30
PART NUMBER: 36V73A16, 17

CAUSES: CONTAMINATION, MECHANICAL SHOCK, ELECTROMAGNETIC FIELDS, VIBRATION

EFFECTS/RATIONALE:
FALSE FIRE SENSOR LIGHT INDICATION. LIGHT WILL NOT BE ACCOMPANIED WITH A TONE AND VERIFICATION CAN BE OBTAINED BY MONITORING THE CONCENTRATION PARAMETER READOUTS ON THE CRT DISPLAY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3042 ABORT: 3/1R

ITEM: SMOKE DETECTION LIGHT MATRIX-LAMPS
FAILURE MODE: PARTIAL OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) LIGHT MATRIX
4) LAMP
5)
6)
7)
8)
9)

CRITICALITIES

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

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ONE LAMP WITHIN A FIRE SENSOR LIGHT INDICATION. UPON AN ALARM, SECOND LAMP WILL ANNUNCIATE THE PROBLEM. AUDIO ALARM AND SMOKE CONCENTRATION FDA ARE UNLIKE REDUNDANCY. LOSS OF ALL FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE DUE TO REACTION TIME DELAY IN APPRAISING FIRE SITUATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3043 ABORT: 3/1R

ITEM: C&W ELECTRONICS UNIT SIREN A & B
FAILURE MODE: PREMATURE, OPERATION, ERRONEOUS OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) C&W ELECTRONICS UNIT
4) SIREN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY 3A AREA 83
PART NUMBER: 83V73A4

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, ELECTROMAGNETIC FIELDS, VIBRATION

EFFECTS/RATIONALE:
LOSS OF EMERGENCY SYSTEM SIRE OUTPUT. VISUAL ANNUNCIATION AND SMOKE CONCENTRATION FDA ARE UNLIKE REDUNDANCY. LOSS OF FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE DUE TO REACTION DELAY IN APPRAISING FIRE SITUATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 3044 ABORT: 1/1

ITEM: SWITCH-FIRE SUPPRESSION AV BAY 1, 2, 3 ARM/SAFE (S1, 2, 3)
FAILURE MODE: PHYSICAL BINDING/JAMMING, OPEN (ELECTRICAL), FAILS TO SWITCH

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) SWITCH
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/1R	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PNL L1A1
PART NUMBER: 31V73A1A1

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF THE COMPONENT RESULTS IN THE LOSS OF THE CAPABILITY TO DISPENSE SUPPRESSANT INTO THE AVIONICS BAY. IN THE PRELAUNCH, ONORBIT, AND LANDING/SAFING PHASES REDUNDANT PORTABLE FIRE BOTTLES ARE AVAILABLE FOR USE TO EXTINGUISH A FIRE. IN THE OTHER PHASES, CREW MOVEMENT IS RESTRICTED THEREFORE THE PORTABLE EXTINGUISHERS ARE INACCESSABLE. LOSS OF REDUNDANCY HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3045 ABORT: 3/3

ITEM: RESISTOR-NO IDENTIFIER (2.2K)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) RESISTOR-ISOLATION (SUPPRESSANT ARM TM)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AVIONICS BAY-LCA 2, 3, 1/AREA 82, 83, 81
PART NUMBER: 82V76A17

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF TELEMETRY DISCRETE FOR ARM FUNCTION STATUS. THE ONBOARD SYSTEM IS UNAFFECTED AND REACTS NORMALLY AND THE CAPACITOR VOLTAGE PARAMETER PROVIDES AN INDICATION OF STATUS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 3046 ABORT: 1/1

ITEM: RESISTOR-NO IDENTIFIER (2.2K)
FAILURE MODE: SHORTED, SHORTED TO GROUND

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) RESISTOR-ISOLATION (SUPPRESSANT ARM TM)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/1R	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY-LCA 2, 3, 1/AREA 82, 83, 81
PART NUMBER: 82V76A17

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
A SHORT TO GROUND CAN RESULT IN THE LOSS OF THE CAPABILITY TO DISPENSE SUPPRESSANT INTO THE AVIONICS BAY. IN THE PRELAUNCH, ON-ORBIT, AND LANDING/SAFING PHASES REDUNDANT PORTABLE FIRE BOTTLES ARE AVAILABLE FOR USE TO SUPPRESS A FIRE. IN THE OTHER PHASES, CREW MOVEMENT IS RESTRICTED THEREFORE THE PORTABLE EXTINGUISHES ARE INACCESSABLE. HOWEVER, LAUNCH/ENTRY ARE SHORT, TRANSITIONAL FLIGHT PHASES. LOSS OF REDUNDANCY HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	7/20/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/3
MDAC ID:	3047	ABORT:	3/3

ITEM: RESISTOR-NO IDENTIFIER (1.8K)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) RESISTOR-BLEED (ARM-TM)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AVIONICS BAY-LCA 2, 3, 1/AREA 82, 83, 81
PART NUMBER: 82V76A17

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THE TELEMETRY ARM DISCRETE SIGNAL IS EITHER LOST OR BIASED. THE ONBOARD FIRE SUPPRESSION SYSTEM IS UNAFFECTED AND REACTS NORMALLY AND THE CAPACITOR VOLTAGE PARAMETER PROVIDES AN INDICATION OR STATUS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 3048 ABORT: 1/1

ITEM: SWITCH-FIRE SUPPRESSION AV BAY 1, 2, 3 AGENT DISCH (S4, S5, S6)
FAILURE MODE: PHYSICAL BINDING/JAMMING, OPEN (ELECTRICAL), FAILS TO SWITCH

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) SWITCH
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/1R	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PNL L1A1
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF THE COMPONENT RESULTS IN THE LOSS OF THE CAPABILITY TO DISPENSE SUPPRESSANT INTO THE AVIONICS BAY. IN THE PRELAUNCH, ONORBIT, AND LANDING/SAFING PHASES REDUNDANT PORTABLE FIRE BOTTLES ARE AVAILABLE FOR USE TO EXTINGUISH A FIRE. LOSS OF REDUNDANCY HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE. IN THE OTHER PHASES, CREW MOVEMENT IS RESTRICTED THEREFORE THE PORTABLE EXTINGUISHERS ARE INACCESSABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3049 ABORT: 3/3

ITEM: LIGHT-FIRE SUPPRESSION AV BAY 1, 2, 3 AGENT DISCH (S4, S5, S6)
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) PUSH BUTTON INDICATOR
4) LAMP
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ONE LAMP WITHIN A AGENT DISCH LIGHT INDICATION. UPON DISCHARGE THE SECOND LAMP WILL ANNUNCIATE THE COMPLETION OF THE FUNCTION. IN ADDITION, MONITORING SMOKE DETECTOR CONCENTRATION VARIATIONS OR CREW SENSE OF HALON 1301 IN THE CABIN AIR CAN VERIFY DISCHARGE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3050 ABORT: 3/3

ITEM: ANNUNCIATOR CONTROL ASSEMBLY (ACA) 3
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) ACA
4) LAMP DRIVER (AGENT DISCHG LT)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AREA 30 FLT DECK
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF THE AGENT DISCH LIGHT INDICATION. MONITORING OF THE SMOKE CONCENTRATION LEVEL VARIATIONS OR CREW SENSE CAN BE USED TO DETECT AGENT DISCHARGE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3051 ABORT: 3/3

ITEM: ANNUNCIATOR CONTROL ASSEMBLY (ACA) 3
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) ACA
4) LAMP DRIVER (AGENT DISCHG LT)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AREA 30 FLT DECK
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, ELECTROMAGNETIC FIELDS, VIBRATION

EFFECTS/RATIONALE:
FALSE AGENT DISCH INDICATION. VERIFICATION OF SUPPRESSANT STATUS CAN BE VERIFIED (LEVEL OF CONFIDENCE) BY MONITORING SMOKE DETECTOR CONCENTRATION LEVEL OR CREW SENSE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 3052

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: DIODE-NO IDENTIFIER
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION-ARM CKT
3) DIODE-ISOLATION (PRE FLT ARM CKT)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/1R	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: AVIONICS BAY-LCA 2, 3, 1/AREA 82, 83, 81
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THIS DIODE IS ON THE FIRE SUPPRESSION ARMING SWITCH LINE. FAILURE RESULTS IN LOSS OF CAPABILITY TO DISPENSE SUPPRESSANT INTO THE AVIONICS BAY. IN THE PRELAUNCH, ONORBIT, AND LANDING/SAFING PHASES REDUNDANT PORTABLE FIRE SUPPRESSANT BOTTLES ARE AVAILABLE FOR USE TO EXTINGUISH A FIRE. IN ALL OTHER PHASES, CREW MOVEMENT IS RESTRICTED THEREFORE THE PORTABLE EXTINGUISHERS ARE INACCESSABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3053 ABORT: 3/3

ITEM: DIODE-NO IDENTIFIER
FAILURE MODE: SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION-ARM CKT
3) DIODE-ISOLATION (PREFLT ARM CKT)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AVIONICS BAY-LCA 2, 3, 1/AREA 82, 83, 81
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THIS DIODE IS ON THE FIRE SUPPRESSION ARMING SWITCH LINE. NO EFFECT ON CIRCUIT, FLIGHT OPERATIONS WORK NOMINALLY. NOTE: NOT SURE WHY THE DIODE EXISTS IN THE CIRCUIT. IF THE PREFLT BUS IS USED FOR CHECKOUT, THE CHECKOUT WOULD BE MORE COMPLETE WITHOUT THE DIODE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3054 ABORT: 3/3

ITEM: DIODE-NO IDENTIFIER
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION-PRE FLT ARM CKT
3) DIODE-ISOLATION (PRE FLT ARM CKT)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AVIONICS BAY-LCA 2, 3, 1/AREA 82, 83, 81
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THIS DIODE IS ON THE PRE-FLIGHT TEST ARMING REMOTE SWITCH LINE. NO EFFECT ON FLIGHT CIRCUIT. ONLY PREFLIGHT ACTIVITIES ARE AFFECTED IF OPEN. A SECOND FAILURE REQUIRED TO AFFECT THE FLIGHT CIRCUIT IF THE COMPONENT IS SHORTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3055 ABORT: 3/3

ITEM: RESISTOR-NO IDENTIFIER (5.11K)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION-PRE FLT ARM CKT
3) RESISTOR-ISOLATION (ONBOARD ARM CKT)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AVIONICS BAY-LCA 2, 3, 1/AREA 82, 83, 81
PART NUMBER:

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THIS RESISTOR IS ON THE PRE-FLIGHT ARMING REMOTE SWITCH LINE. NO EFFECT ON FLIGHT CIRCUIT. ONLY PREFLIGHT ACTIVITIES ARE AFFECTED IF OPEN. A SECOND FAILURE IS REQUIRED TO AFFECT THE FLIGHT CIRCUIT IF THE COMPONENT IS SHORTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 3056 ABORT: 1/1

ITEM: PYRO CONTROLLER NO. 1, 2, 3
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) PYRO CONTROLLER
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/1R	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: LCA-2, LCA-3, FLCA-1
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, PARTIAL INPUT, VIBRATION

EFFECTS/RATIONALE:
FAILURE OF THE COMPONENT RESULTS IN THE LOSS OF THE CAPABILITY TO DISPENSE SUPPRESSANT INTO THE AVIONICS BAY. IN THE PRELAUNCH, ONORBIT, AND LANDING/SAFING PHASES REDUNDANT PORTABLE FIRE BOTTLES ARE AVAILABLE FOR USE TO EXTINGUISH A FIRE. IN THE OTHER PHASES, CREW MOVEMENT IS RESTRICTED THEREFORE THE PORTABLE EXTINGUISHERS ARE INACCESSABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 3057 ABORT: 2/2

ITEM: PYRO CONTROLLER NO. 1, 2, 3
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: J.D. ARBET SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) PYRO CONTROLLER
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: LCA-2, LCA-3, FLCA-1
PART NUMBER:

CAUSES: MECHANICAL SHOCK, ELECTROMAGNETIC FIELDS, VIBRATION

EFFECTS/RATIONALE:
INADVERTANT DISCHARGE OR FIRE SUPPRESSANT. EMERGENCY SYSTEM CAPABILITIES LOSS IN CASE A REAL SMOKE/FIRE SITUATION DEVELOPS. HALON 1301 IS VERY TOXIC TO THE CREW AND THE MISSION CANNOT BE SUSTAINED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 3058

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 2/1R
ABORT: 2/1R

ITEM: SMOKE DETECTOR (9)
FAILURE MODE: LOSS OF ALL OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) DETECTOR
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: FAILURE OF PUMP, POWER SUPPLY ELECTRONICS, VDC, ALARM OUTPUT, INLET FILTER BLOCKED

EFFECTS/RATIONALE:
LOSS OF SMOKE DETECTOR FUNCTION FOR ALARMS AND SMOKE CONCENTRATION DETECTION. THE FIRE CAN BE SENSED AND ALARMED BY THE REDUNDANT DETECTOR. LOSS OF FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 3059 ABORT: 2/2

ITEM: FIRE SUPPRESSANT ASSEMBLY (9)
FAILURE MODE: EXTERNAL LEAKAGE, PREMATURE OPERATION

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) FIRE SUPPRESSANT ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/2	RTLS:	3/3
LIFTOFF:	2/2	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	2/2
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AV BAY 1,2, 3, CREW AREA
PART NUMBER:

CAUSES: PIECE-PART FAILURE OF PYRO INITIATOR, SPRING, DIAPHRAM

EFFECTS/RATIONALE:
LOSS OF FIRE SUPPRESSANT WITHOUT THE INDICATION FOR A FIRE. CABIN CONTAMINATION WITH HALON 1301 WILL EXCEED OSHA STANDARDS OF 1000 PPM WITHIN 50 HOURS OF DISCHARGE. THE LIOH CANISTERS DO NOT ABSORB MUCH HALON 1301 (80 gpm & 2.5 kg) AND THE REMAINING SUBSTANCE IS CONSIDERED TOXIC FOR THE CREW IN THE CABIN CLOSED ENVIRONMENT. THE MISSION SHOULD BE TERMINATED AT THE FIRST OPPORTUNITY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 3060 ABORT: 1/1

ITEM: FIRE SUPPRESSANT ASSEMBLY (9)
FAILURE MODE: FAILS TO OPERATE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) FIRE SUPPRESSANT ASSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/1R	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION:
PART NUMBER:

CAUSES: PYRO FAILS TO IGNITE, KNIFE JAMS, NOZZLE RESTRICTED FLOW, PIECE-PART FAILURE

EFFECTS/RATIONALE:
INABILITY TO SUPPRESS IMMINENT FIRE. FOR PRELAUNCH, ONORBIT, AND LANDING/SAFING, THE CREW CAN REACT AND HAVE THE CABIN MOBILITY TO USE A UNLIKE REDUNDANT PORTABLE BOTTLE. HOWEVER, SCREEN B IS FAILED BECAUSE UPON DETECTION OF THIS FAILURE, THE CREW MAY NOT HAVE ENOUGH TIME FOR CORRECTIVE ACTION. DURING LIFTOFF, DEORBIT, AND ABORT SITUATION, THE CREW HAS THE POTENTIAL FOR LOSS OF LIFE/VEHICLE DUE TO THEIR IMMOBILITY AND INABILITY TO OPERATE THE PORTABLE BOTTLES.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3061 ABORT: 3/3

ITEM: PORTABLE FIRE SUPPRESSANT ASSEMBLY
FAILURE MODE: INTERNAL/EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE), PREMATURE OPERATION

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) PORTABLE FIRE SUPPRESSANT ASSSEMBLY
4) BROMO TRIFLOUROMETHANE SUPPRESSANT TANK
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT
PART NUMBER:

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:
PREMATURE LOSS OF FIRE SUPPRESSANT. THREE OTHER BOTTLES AVAILABLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 3062 ABORT: /NA

ITEM: PORTABLE FIRE SUPPRESSANT ASSEMBLY
FAILURE MODE: FAILS TO RELEASE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) FIRE SUPPRESSION
3) PORTABLE FIRE SUPPRESSANT ASSSEMBLY
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: CREW COMPARTMENT
PART NUMBER:

CAUSES: MISHANDLING/ABUSE, CHEMICAL REACTION

EFFECTS/RATIONALE:
LOSS OF THE CAPABILITY TO EXTINGUISH A FIRE WITH THE FAILED BOTTLE. DURING PRELAUNCH, ON-ORBIT, AND LANDING/SAFING THREE PORTABLE EXTINGUISHERS ARE AVAILABLE. LOSS OF FUNCTION CAN LEAD TO LOSS OF LIFE/VEHICLE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 3063 ABORT: 3/3

ITEM: HYBRID DRIVER (TYPE III) (3)
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) GROUND DRIVER
4) ARMING DRIVER (3)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO MISSION IMPACT. PRELAUNCH, WHEN IT IS USED, THE ITEM CAN BE FIXED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	9/22/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/3
MDAC ID:	3064	ABORT:	3/3

ITEM: HYBRID DRIVER (TYPE I) (3)
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) GROUND DRIVER
4) FIRE DRIVER (3)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO MISSION IMPACT. PRELAUNCH, WHEN IT IS USED, THE ITEM CAN BE FIXED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 9/22/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 1/1
MDAC ID: 3065 ABORT: 1/1

ITEM: HYBRID DRIVER (TYPE II) (3)
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) SMOKE DETECTION
3) GROUND DRIVER
4) FIRE DRIVER (3)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	2/1R	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	2/1R	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	2/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:
FAILURE PRECLUDES THE DISCHARGE OF HALON INTO THE AVIONICS BAY. FOR PRELAUNCH, ON-ORBIT, AND LANDING/SAFING, THE CREW CAN ACCESS THE PORTABLE SUPPRESSANT BOTTLES. LOSS OF FUNCTION HAS THE POTENTIAL FOR LOSS OF LIFE. DURING LIFT OFF AND DE-ORBIT REDUNDANT SYSTEM IS INACCESSABLE AND THERE IS A POTENTIAL FOR LOSS OF LIFE/VEHICLE.

REFERENCES:

C.4

AIRLOCK SUPPORT SYSTEM

Analysis Worksheets

AIRLOCK SUPPORT SYSTEM

MDAC-ID		CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
5001		3/3	3/3		VISUAL PRESSURE GAUGE (2)
5002		3/3	3/3		SUPPLY H2O PRESS. SENSOR (1)
5003	(*)	2/2	3/3		EMU WATER SUPPLY VALVE (2)
5004		3/2R	3/3	P P P	EMU WATER SUPPLY VALVE (2)
5005	(*)	2/2	3/3		EMU WATER SUPPLY VALVE (2)
5006	(*)	2/2	3/3		EMU WATER SUPPLY SWITCH (2)
5007		3/3	3/3		POSITION INDICATOR (2)
5008		3/3	3/3		RESISTOR (A1R1 AND A2R1) (2)
5009	(*)	2/2	3/3		CB, EMU WATER SUPPLY (1)
5010		3/3	3/3		CB, EMU WATER SUPPLY (1)
5011	(*)	2/2	3/3		EMU WASTE WATER VALVE (2)
5012		3/3	3/3		EMU WASTE WATER VALVE (2)
5013		3/2R	3/3	P P P	EMU WASTE WATER VALVE (2)
5014	(*)	2/2	3/3		EMU WASTE WATER SWITCH (2)
5015		3/3	3/3		POSITION INDICATOR (2)
5016		3/3	3/3		RESISTOR (A1R2 AND A2R2) (2)
5017	(*)	2/2	3/3		CB, EMU WASTE WATER (1)
5018		3/3	3/3		CB, EMU WASTE WATER (1)
5019	(*)	2/2	3/3		SUPPLY AND WASTE COUPLINGS (4)
5020	(*)	2/2	3/3		SUPPLY LINES AND FITTINGS (1)
5021		3/2R	3/3	P P P	WASTE LINES AND FITTINGS (1)
5022	(*)	2/1R	3/3	P P P	O2 LINES AND FITTINGS (1)
5023		3/3	3/3		VISUAL O2 PRESSURE GAUGE (1)
5024		3/3	3/3		O2 SUPPLY PRESSURE SENSOR (2)
5025	(*)	2/2	3/3		EMU O2 SUPPLY VALVE (2)
5026		3/2R	3/3	P P P	EMU O2 SUPPLY VALVE (2)
5027	(*)	2/1R	2/1R	P P P	EMU O2 SUPPLY VALVE (2)
5028	(*)	2/1R	3/3	P P P	EMU O2 SUPPLY COUPLINGS
5029	(*)	2/2	3/3		DEPRESS CAP VENT (1)
5030	(*)	2/2	3/3		CAP VENT DEBRIS SCREEN (1)
5031	(*)	2/2	3/3		CAP VENT DEBRIS SCREEN (1)
5032		3/1R	3/3	P P P	DEPRESS VALVE/CAP (1 EACH)
5033	(*)	2/2	3/3		DEPRESS VALVE (1)
5034		3/2R	3/3	P P P	DEPRESS VALVE/CAP (1 EACH)
5035	(*)	2/1R	3/3	P P P	AIRLOCK TO CABIN VENT CAP (2)
5036		3/3	3/3		AIRLOCK TO CABIN VENT CAP (2)
5037	(*)	2/1R	3/3	P P P	AIRLOCK TO CABIN FILTER (2)
5038		3/3	3/3		AIRLOCK TO CABIN FILTER (2)
5039	(*)	2/1R	3/3	P P P	EQUALIZATION VALVE (2)
5040		3/2R	3/3	P P P	EQUALIZATION VALVE (2)

(*) Potential Critical Items.

AIRLOCK SUPPORT SYSTEM (concluded)

MDAC-ID	CRITICALITY FLIGHT H/F	CRITICALITY ABORT H/F	REDUNDANCY SCREENS A B C	ITEM NAME
5041 (*)	2/2	3/3		EQUALIZATION VALVE (2)
5042	3/3	3/3		PRESSURE DIFFERENTIAL (2)
5043 (*)	2/2	3/3		PRESSURE DIFFERENTIAL (2)
5044	3/3	3/3		DIFF. PRESSURE SENSOR (1)
5045	3/3	3/3		WALL TEMPERATURE SENSOR (1)
5046	3/2R	3/3	P P P	VENT CAP (2)
5047	3/3	3/3		VENT CAP (2)
5048	3/2R	3/3	P P P	FILTER (2)
5049	3/3	3/3		FILTER (2)
5050	3/2R	3/3	P P P	EQUALIZATION VALVE (2)
5051	3/3	3/3		EQUALIZATION VALVE (2)
5052 (*)	2/2	3/3		EQUALIZATION VALVE (2)
5053	3/3	3/3		PRESSURE DIFFERENTIAL (2)
5054	3/2R	3/3	P P P	PRESSURE DIFFERENTIAL (2)
5055 (*)	2/2	3/3		BUS SELECT SWITCH (2)
5056 (*)	2/2	3/3		REMOTE POWER CONTROLLER (4)
5057	3/2R	3/3	P P P	DIODE (4)
5058	3/2R	3/3	P P P	DIODE (4)
5059 (*)	2/2	3/3		POWER SUPPLY (2)
5060 (*)	2/2	3/3		POWER SUPPLY (2)
5061	3/3	3/3		EMU INPUT SWITCH (1)
5062	3/3	3/3		EMU VOLT/CURRENT INDICATOR (1)
5063	3/3	3/3		CURRENT SENSOR (1)
5064	3/3	3/3		VOLTAGE SENSOR (1)
5065	3/2R	3/3	P P P	VACUUM VENT ISOLATION VALVE (1)
5066 (*)	2/1R	3/3	P F P	VACUUM VENT ISOLATION VALVE (1)
5067 (*)	3/1R	3/3	P F P	SW, ISOL VLV CNTRL (1)
5068	3/2R	3/3	P P P	SW, ISOL VLV CNTRL (1)
5069 (*)	3/1R	3/3	P F P	SW, ISOL VLV BUS SELECT (1)
5070	3/2R	3/3	P P P	SW, ISOL VLV BUS SELECT (1)
5071	3/2R	3/3	P P P	CB, ISOL VLV (1)
5072	3/2R	3/3	P P P	CB, ISOL VLV (1)
5073	3/3	3/3		DIODES, ISOL VLV (2)
5074	3/3	3/3		BUS ISOLATION DIODES (2)
5075	3/3	3/3		BUS ISOLATION DIODES (2)
5076	3/3	3/3		BUS SELECT SENSOR (2)
5077	3/3	3/3		CNTRL VLV SWITCH INDICATOR (1)
5078	3/3	3/3		BARBER POLE INDICATOR (1)
5079	3/3	3/3		RESIS, ISOL VALVE SW SENSOR (2)
5080	3/3	3/3		RESIS, BUS SELECT SW SENSOR (2)
5081	3/3	3/3		RESIS, ISOL VLV SENSOR POWER (1)
5082	3/3	3/3		DEDICATED SIG COND (1)
5083	3/3	3/3		DEDICATED SIG COND (1)

(*) Potential Critical Items.

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5001 ABORT: 3/3

ITEM: VISUAL PRESSURE GAUGE
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82D
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL. A PRESSURE TRANSDUCER IN THE EMU, DOWNSTREAM OF THE FLOW RESTRICTOR, INDICATES THE FEED WATER PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5002 ABORT: 3/3

ITEM: ECLSS H2O SUPPLY PRESS. SENSOR (V64-P0201A)
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) PRESSURE SENSOR
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES:

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL. A PRESSURE TRANSDUCER IN THE EMU DOWNSTREAM OF THE FLOW RESTRICTOR, INDICATES THE FEED WATER PRESSURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5003 ABORT: 3/3

ITEM: EMU WATER SUPPLY VALVE (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82D
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF MISSION DUE TO INABILITY TO TOP OFF WATER TANKS AND PURGE THE EMU SYSTEM OF AIR BUBBLES, IN THE EMU. THE CONTINGENCY PLAN CALLS FOR ONE SCU TO BE SHARED BY BOTH EMU'S. (FAILURE ANALYSIS ASSUMES BASELINE MISSION WITH TWO SUITED CREWMEMBERS).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5004 ABORT: 3/3

ITEM: EMU WATER SUPPLY VALVE (2)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE SCU SELF SEALING QUICK DISCONNECT PROVIDES AN UNLIKE REDUNDANCY. HOWEVER, LOSS OF FUNCTION CAN LEAD TO LOSS OF MISSION DUE TO A DRASTIC REVALVING OF THE "SUPPLY WATER MANAGEMENT SYSTEM" WHICH WILL HAMPER THE ORBITER WATER SYSTEM'S OPERATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5005 ABORT: 3/3

ITEM: EMU WATER SUPPLY VALVE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FREE WATER IN THE AIRLOCK AND CABIN CREATES ELECTRICAL SHORT HAZARDS AND HIGH HUMIDITY FORCING THE ISOLATION OF THE EMU SUPPLY WATER LINE. IN ADDITION, THE EMU MAY NOT BE SERVICED PROPERLY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5006 ABORT: 3/3

ITEM: EMU WATER SUPPLY SWITCH (2)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) SUPPLY VALVE (S1, S3)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE ASSUMES THE VALVE IS LEFT CLOSED PRIOR TO SERVICING THE EMU (WORST CASE). SAME SCENARIO AS VALVE FAILED CLOSED (MDAC ID 5003).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5007 ABORT: 3/3

ITEM: EMU WATER SUPPLY STATUS INDICATOR (2)
FAILURE MODE: ERRATIC OPERATION, FAILS TO REMAIN OPEN/CLOSED, FAILS MID-TRAVEL, FAILS OUT OF TOLERANCE, FAILS TO SWITCH

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) SUPPLY VALVE
5) STATUS INDICATOR (DS1, DS3)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5008 ABORT: 3/3

ITEM: RESISTOR (A1R1 AND A2R1)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) SUPPLY VALVE
5) SENSORS V64X0515E & 535E
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82D
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
SENSORS V64-X0515E AND V64-X0535E ARE DISABLED. NOT MISSION ESSENTIAL. BARBER POLE INDICATION STILL OPERATIONAL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5009 ABORT: 3/3

ITEM: EMU WATER SUPPLY CIRCUIT BREAKER (2)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) SUPPLY VALVE
5) CIRCUIT BREAKER (CB57, CB58)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML86B
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE ASSUMES THE FAILURE OF THE BREAKER LEAVES THE VALVE CLOSED PRIOR TO SERVICING THE EMU (WORST CASE). SAME SCENARIO AS VALVE FAILED CLOSED (MDAC ID 5003).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5010 ABORT: 3/3

ITEM: EMU WATER SUPPLY CIRCUIT BREAKER (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) SUPPLY VALVE
5) CIRCUIT BREAKER (CB57, CB58)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML86B
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF OVERLOAD PROTECTION. NO MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5011 ABORT: 3/3

ITEM: EMU WASTE WATER VALVE (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF MISSION DUE TO INABILITY TO DRAIN CONDENSATE FROM EMU. (FAILURE ANALYSIS ASSUMES BASELINE MISSION WITH TWO SUITED CREWMEMBERS).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	8/04/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/3
MDAC ID:	5012	ABORT:	3/3

ITEM: EMU WASTE WATER VALVE (2)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE IS INCONSEQUENTIAL ONCE THE SUPPLY VALVE IS CLOSED AND SCU IS DISCONNECTED. IN ADDITION, THE SCU REGULATOR TO THIS LINE WILL BE CLOSED ONCE THE PRESSURE UPSTREAM FALLS BELOW 16.5 PSI.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5013 ABORT: 3/3

ITEM: EMU WASTE WATER VALVE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE VALVE WILL LEAK WATER OUT TO THE ECLSS DISPLAY AND CONTROL CABINET WHEN THE EMU MAKES A WATER DUMP. FREE WATER IN THE CABINE CAN CAUSE OTHER FAILURES IN THE ELECTRICAL SYSTEM. THE FAILURE IS NOT READILY NOTICEABLE BECAUSE THE WATER QUANTITIES ARE SMALL. WHEN THE SCU PRESSURE REGULATOR VALVE IS CLOSED, AND THE WASTE MANAGEMENT FAN/SEPARATOR IS ACTIVATED, THIS VALVE WILL LEAK AIR INTO THE WASTE MANAGEMENT SYSTEM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5014 ABORT: 3/3

ITEM: EMU WASTE WATER SWITCH (2)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) WASTE VALVE (S2, S4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82D
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE ASSUMES THE VALVE IS LEFT CLOSED PRIOR TO SERVICING THE EMU (WORST CASE). SAME SCENARIO AS VALVE FAILED CLOSED (MDAC ID 5011).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5015 ABORT: 3/3

ITEM: EMU WASTE WATER STATUS INDICATOR (2)
FAILURE MODE: ERRATIC OPERATION, FAILS TO REMAIN OPEN/CLOSED, FAILS MID-TRAVEL, FAILS OUT OF TOLERANCE, FAILS TO SWITCH

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) WASTE VALVE
5) INDICATOR STATUS (DS2, DS4)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82D
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
EMU FUNCTION CAN INDICATE OPERATION. NO MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5016 ABORT: 3/3

ITEM: RESISTOR (A1R2 AND A2R2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) WASTE VALVE
5) SENSORS V64X0505E & 525E
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82D
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
SENSORS V640X0505E AND X0525E ARE DISABLED. NOT MISSION ESSENTIAL. BARBER POLE OPERATION STILL OPERATIONAL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5017 ABORT: 3/3

ITEM: EMU WASTE WATER CIRCUIT BREAKER (2)
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) WASTE VALVE
5) CIRCUIT BREAKER (CB60, CB61)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML86B
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE ASSUMES THE CIRCUIT BREAKER FAILURE LEAVES THE VALVE CLOSED PRIOR TO SERVICING THE EMU (WORST CASE). SAME SCENARIO AS VALVE FAILED CLOSED (MDAC ID 5011).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5018 ABORT: 3/3

ITEM: EMU WASTE WATER CIRCUIT BREAKER (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4) WASTE VALVE
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML86B
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF OVERLOAD PROTECTION. NO MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5019 ABORT: 3/3

ITEM: EMU WATER SUPPLY AND WASTE COUPLINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF MISSION DUE TO CREWMAN'S INABILITY TO TOP OFF OR CHANGE WATER IN THE EMU TANKS. IN ADDITION, FREE WATER IN THE AIRLOCK AND CABIN CREATES ELECTRICAL HAZARDS AND HIGH HUMIDITY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5020 ABORT: 3/3

ITEM: EMU WATER SUPPLY LINES AND FITTING
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOTE: THE LEAK IS LOCATED BETWEEN THE SUPPLY VALVE AND THE SCU. FOR LEAKS BEYOND THE SUPPLY VALVE SEE THE IOA "SUPPLY WATER MANAGEMENT SUBSYSTEM". THE LINE IS ISOLATED DURING ASCENT AND ENTRY. ON ORBIT, A SEVERE LEAK CAUSES LOSS OF MISSION DUE TO CREWMEN INABILITY TO TOP-OFF WATER TANKS AND PURGE THE EMU. IN ADDITION, FREE WATER IN THE AIRLOCK AND CABIN CREATES ELECTRICAL SHORT HAZARDS AND HIGH HUMIDITY, FORCING THE ISOLATION OF THE EMU SUPPLY LINE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5021 ABORT: 3/3

ITEM: EMU WASTE WATER LINES AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) WATER SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOTE: THE LEAK IS LOCATED BETWEEN THE WASTE WATER VALVE AND THE SCU. FOR LEAKS BEYOND THIS VALVE SEE IOA "SUPPLY WATER MANAGEMENT SYSTEM". THE SYSTEM WILL LEAK WATER OUT TO THE ECLSS DISPLAY AND CONTROL CABINET WHEN THE EMU MAKES A WATER DUMP. FREE WATER IN THIS AIRLOCK AND CABIN CAN CAUSE OTHER FAILURES IN THE ELECTRICAL SYSTEM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 5022 ABORT: 3/3

ITEM: O2 SUPPLY LINES AND FITTINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) OXYGEN SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOTE: THE LEAK IS LOCATED BETWEEN THE EMU OXYGEN SUPPLY VALVES AND THE SCU. FOR LEAKS BEYOND THIS VALVE SEE IOA "ARPCS" ANALYSIS. DURING LIFTOFF AND ENTRY, THE LEAK IS ISOLATED BECAUSE THE VALVE IS CLOSED. ON ORBIT THE EXCESS OXYGEN IN THE AIRLOCK CREATES A FIRE HAZARD.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5023 ABORT: 3/3

ITEM: VISUAL O2 PRESSURE GAUGE (1)
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) OXYGEN SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82D
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5024 ABORT: 3/3

ITEM: O2 SUPPLY PRESSURE SENSOR (2)
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, OPEN, LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) OXYGEN SYSTEM
4) PRESSURE SENSOR (V64P0202A)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5025 ABORT: 3/3

ITEM: EMU O2 SUPPLY VALVE (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) OXYGEN SYSTEM
4) SUPPLY VALVE (2)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF MISSION DUE TO INABILITY TO MAINTAIN OXYGEN CAPACITY IN THE EMU (CRITICALITY ASSUMES BASELINE MISSION WITH TWO SUITED CREWMEMBERS). FAILURE TO PREVENT DEPLETION OF THE PLSS OXYGEN TANKS PRIOR TO EVA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5026 ABORT: 3/3

ITEM: EMU O2 SUPPLY VALVE (2)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) OXYGEN SYSTEM
4) SUPPLY VALVE (2)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/2R	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
INABILITY TO ISOLATE THE AFFECTED SCU LEG. PRESSURE CAN BE MANAGED BY SELF SEALING QUICK COUPLING. LOSS OF REDUNDANCY IS LOSS OF EMU MISSION. THE LEAK MAY BE ISOLATED CLOSING THE CABIN OXYGEN CROSSOVER VALVES LV3 AND LV4 WITH SWITCHES S15 AND S18.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	8/04/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	2/1R
MDAC ID:	5027	ABORT:	2/1R

ITEM: EMU O2 SUPPLY VALVE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) OXYGEN SYSTEM
4) SUPPLY VALVE (2)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/2R	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
DURING LIFT OFF AND ENTRY, THE LEAK WILL RESULT IN HIGH CABIN PP02 TRIGGERING THE KLAXON AND CREATING A FIRE HAZARD. THE LEAK CANNOT BE ISOLATED BECAUSE OXYGEN SUPPLY TO THE LAUNCH/ENTRY HELMETS IS REQUIRED. ONORBIT THE LEAK CAN BE ISOLATED BY CLOSING LV3 AND LV4 WITH SWITCHES S15 AND S18. HOWEVER THE EMU MISSION CANNOT BE ACCOMPLISHED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 5028 ABORT: 3/3

ITEM: EMU O2 SUPPLY COUPLINGS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) OXYGEN SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
DURING ORBIT, WHEN THE OXYGEN SUPPLY VALVES ARE OPENED, THE LEAK WILL RESULT IN HIGH PP02 IN THE AIRLOCK CREATING A FIRE HAZARD. IN ADDITION, DEPENDING ON THE LEAK'S SEVERITY, THE CREWMEMBER MAY NOT GET ENOUGH FLOW TO PREVENT DEPLETION OF THE PLSS OXYGEN TANKS PRIOR TO EVA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5029 ABORT: 3/3

ITEM: DEPRESS CAP VENT (1)
FAILURE MODE: FAILS TO OPEN, PHYSICAL BINDING/JAMMING

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) DEPRESS SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW82A
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:
HATCH CANNOT BE OPENED FOR EVA UNLESS THE AIRLOCK IS DEPRESSURIZED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5030 ABORT: 3/3

ITEM: CAP VENT DEBRIS SCREEN (1)
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) DEPRESS SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:
IF THE FIRST DEBRIS SCREEN CANNOT BE REMOVED WHEN IT BECOMES BLOCKED WITH FROST, FULL DECOMPRESSION CANNOT BE ATTAINED, THE HATCH CANNOT BE OPENED TO START THE EVA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5031 ABORT: 3/3

ITEM: CAP VENT DEBRIS SCREEN (1)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) DEPRESS SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, LODGED DEBRIS

EFFECTS/RATIONALE:
IF THE SECOND DEBRIS SCREEN BECOMES BLOCKED WITH FROST BEFORE FULL DECOMPRESSION IS ATTAINED, THE HATCH CANNOT BE OPENED TO START THE EVA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 5032 ABORT: 3/3

ITEM: DEPRESS VALVE/CAP (1 EACH)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) DEPRESS SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
AIRLOCK PRESSURE CANNOT BE MAINTAINED FORCING THE CLOSURE OF THE VACUUM VENT ISOLATION VALVE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5033 ABORT: 3/3

ITEM: DEPRESS VALVE (1)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) DEPRESS SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
AIRLOCK CANNOT BE DEPRESSURIZED, HATCH CANNOT BE OPENED FOR EVA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5034 ABORT: 3/3

ITEM: DEPRESS VALVE/CAP (1 EACH)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) DEPRESS SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
AIRLOCK CAN BE REPRESSURIZED AFTER SEALING THE SYSTEM WITH THE VALVE SEALING CAP. ALTERNATELY, THE VACUUM VENT ISOLATION VALVE CAN BE CLOSED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 5035 ABORT: 3/3

ITEM: AIRLOCK TO CABIN VENT CAP (2)
FAILURE MODE: FAILS TO OPEN, PHYSICAL BINDING/JAMMING, RESTRICTED FLOW

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:
AIRLOCK CAN ONLY BE REPRESSURIZED THROUGH ONE VALVE. LOSS OF REDUNDANCY CAN LEAD TO LOSS OF LIFE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5036 ABORT: 3/3

ITEM: AIRLOCK TO CABIN VENT CAP (2)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:
WITHOUT THE VENT CAP THE PRESSURE DROP ACROSS THE BUTTERFLY OF THIS EQUALIZATION VALVE WILL BE GREATER. THIS MAY LEAD TO INCREASED LEAK RATES WHILE THE AIRLOCK IS DEPRESSURIZED. HOWEVER, THERE ARE NO OTHER EFFECTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 5037 ABORT: 3/3

ITEM: AIRLOCK TO CABIN FILTER (2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, LODGING DEBRIS

EFFECTS/RATIONALE:
AIRLOCK CAN ONLY BE REPRESSURIZED THROUGH ONE OF TWO VALVES.
LOSS OF REDUNDANCY CAN LEAD TO LOSS OF LIFE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5038 ABORT: 3/3

ITEM: AIRLOCK TO CABIN FILTER (2)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE IS QUESTIONABLE. HOWEVER, SHOULD IT OCCUR, THE EFFECTS ARE NOT CONSEQUENTIAL.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 5039 ABORT: 3/3

ITEM: AIRLOCK TO CABIN EQUALIZATION VALVE (2)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
AIRLOCK CAN ONLY BE REPRESSURIZED THROUGH ONE OF TWO VALVES. LOSS OF REDUNDANCY CAN LEAD TO LOSS OF LIFE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5040 ABORT: 3/3

ITEM: AIRLOCK TO CABIN EQUALIZATION VALVE (2)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THIS FAILURE WILL PRECLUDE DEPRESSURIZATION OF THE AIRLOCK. LOSS OF A GOOD SEAL WITH THE VENT CAP LEADS TO LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5041 ABORT: 3/3

ITEM: AIRLOCK TO CABIN EQUALIZATION VALVE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
LEAKS IN THIS VALVE CAN LEAD TO LOSS OF THE ABILITY TO DEPRESSURIZE THE AIRLOCK. LOSS OF MISSION DUE TO CONTINUAL CABIN LEAK IF THE CREW GOES EVA.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5042 ABORT: 3/3

ITEM: AIRLOCK TO CABIN PRESSURE DIFFERENTIAL (2)
FAILURE MODE: ERRATIC OPERATION, FAILS MID-TRAVEL, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, PHYSICAL BINDING/JAMMING, DELAYED OPERATION, ERRONEOUS OUTPUT, PARTIAL OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5) MEASUREMENT
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
CREW INCONVENIENCE. IF THE AIRLOCK PRESSURE DROPS BELOW 4.2 PSIA AND THE EMU IS STILL ON VEHICLE POWER, A WARNING TONE IS ISSUED AND THE CREWMEMBER IS INSTRUCTED TO SWITCH TO BATTERY POWER AND TO DISCONNECT THE SCU.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5043 ABORT: 3/3

ITEM: AIRLOCK TO CABIN PRESSURE DIFFERENTIAL (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5) MEASUREMENT
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF MISSION DUE TO CONTINUAL CABIN LEAK IF CREW GOES ON EVA (HATCH DOOR TO PAYLOAD BAY IS LEFT OPEN DURING EVA).

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5044 ABORT: 3/3

ITEM: AIRLOCK DIFFERENTIAL PRESSURE SENSOR
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTEN OPERATION, DELAYED OPERATION, ERRONEOUS OUTPUT, PARTIAL OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5) MEASUREMENT (V64P0101A, P0102A)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
CREW INCONVENIENCE. SEE MDAC ID 5042.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5045 ABORT: 3/3

ITEM: AIRLOCK WALL TEMPERATURE SENSOR
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTEN OPERATION, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO CABIN
5) MEASUREMENT (V64T0130A, T0131A)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
CREW INCONVENIENCE. NO OTHER EFFECTS. RECORDING OF MEASUREMENT AFTER FAILURE IS LOST.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5046 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT VENT CAP (2)
FAILURE MODE: FAILS TO OPEN, PHYSICAL BINDING/JAMMING, RESTRICTED FLOW

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE ASSUMES THE TUNNEL ADAPTER IS ATTACHED AND AFTER LIFT-OFF THE EQUALIZATION VALVE VENT CAP CANNOT BE REMOVED. THIS PREVENTS THE VALVE FROM OPERATING. A SECOND FAILURE WOULD BE LOSS OF SPACELAB MISSION, DUE TO THE INABILITY TO OPEN THE HATCH.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5047 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT VENT CAP (2)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:
WITH THE TUNNEL ADAPTER ATTACHED, THIS FAILURE HAS NO EFFECT SINCE THIS DOOR IS ALWAYS OPEN TO THE SPACELAB. WITHOUT THE TUNNEL ADAPTER, THIS FAILURE IS NOT REALISTIC SINCE THE CAP WOULD HAVE NOT BEEN NOMINALLY REMOVED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5048 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT FILTER (2)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, LODGED DEBRIS

EFFECTS/RATIONALE:
THE FAILURE ASSUMES THE TUNNEL ADAPTER IS ATTACHED AND AFTER LIFT OFF THE EQUALIZATION VALVE CANNOT FUNCTION DUE TO A SEVERELY CONTAMINATED FILTER. A SECOND FAILURE WOULD BE LOSS OF SPACELAB MISSION, DUE TO THE INABILITY TO OPEN THE HATCH.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5049 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT FILTER (2)
FAILURE MODE: FAILS OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THIS FAILURE IS QUESTIONABLE. HOWEVER, SHOULD IT OCCUR, THEY ARE NO FURTHER EFFECTS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5050 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT EQUALIZATION VALVE (2)
FAILURE MODE: FAILS TO OPEN, RESTRICTED FLOW

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THE FAILURE ASSUMES THE TUNNEL ADAPTER IS ATTACHED AND AFTER LIFT-OFF THE VALVE CANNOT BE OPENED TO EQUALIZE THE PRESSURE ACROSS THE HATCH AND ACROSS THE SPACELAB. THE SECOND VALVE FAILURE IS LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5051 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT EQUALIZATION VALVE (2)
FAILURE MODE: FAILS TO CLOSE, INTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
WITH THE TUNNEL ADAPTER ATTACHED, THIS FAILURE HAS NO EFFECT SINCE THE HATCH FACING THE CABIN CAN BE CLOSED TO ISOLATE THE PAYLOAD BAY EQUIPMENT FROM THE CREW. IN ADDITION, THE HATCH IN THE TUNNEL ADAPTER FACING THE SPACELAB CAN BE CLOSED. FURTHER, THE VENT CAP FOR THE FAILED VALVE CAN BE INSTALLED TO BLOCK THE LEAK.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5052 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT EQUALIZATION VALVE (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THIS FAILURE ASSUMES THERE IS NO TUNNEL ADAPTER ATTACHED. THE LEAK CAN DEPRESSURIZE THE AIRLOCK FORCING EVACUATION BY THE AIRLOCK CREW. THE LEAK IS ASSUMED TO BE SMALLER THAN THE FLOW THROUGH THE TWO EQUALIZATION VALVES IN THE HATCH FACING THE CABIN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5053 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT PRESSURE DIFFERENTIAL (2)
FAILURE MODE: ERRATIC OPERATION, FAILS MID-TRAVEL, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, PHYSICAL BINDING/JAMMING, DELAYED OPERATION, ERRONEOUS OUTPUT, PARTIAL OUTPUT, LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
CREW INCONVENIENCE. SEE MDAC ID 1141.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5054 ABORT: 3/3

ITEM: AIRLOCK TO AMBIENT PRESSURE DIFFERENTIAL (2)
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) PRESSURE EQUALIZATION
4) AIRLOCK TO PAYLOAD BAY
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE CRITICALITY ASSUMES THAT THE LEAK THROUGH THE GAUGE CANNOT BE GREATER THAN THE FLOW THROUGH BOTH CABIN HATCH EQUALIZATION VALVES (PER NSTS-22206, 2.3.1.i, CHANGE 2, THE LEAK ASSESSED CAN ONLY OCCUR FROM WITHIN THE INSTRUMENT AND NOT THE PENETRATION. THE CREW CAN WORK AROUND THIS FAILURE IF NECESSARY. FUNCTIONALLY, THE LEAK MAY TERMINATE THE MISSIONS DUE TO OVERTAXING OF THE CONSUMABLES SYSTEM.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5055 ABORT: 3/3

ITEM: EMU POWER/BATTERY CHARGER BUS SELECT SWITCH (2)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER (S1, S2)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW18H
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FAILURE ASSUMES A NOMINAL MISSION WITH TWO CREWMEN. LOSS OF ABILITY TO PROVIDE SCU POWER TO EMU.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5056 ABORT: 3/3

ITEM: EMU POWER/BATTERY CHARGER RPC (4)
FAILURE MODE: INTERMITTENT OPERATION, ERRONEOUS OUTPUT, PARTIAL OUTPUT, FAILS OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) REMOTE POWER CONTROLLER (4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION, ACOUSTICS

EFFECTS/RATIONALE:
FAILURE TO PRODUCE THE CORRECT OUTPUT FOR THE EMU WILL CAUSE LOSS OF MISSION. FAILURE ASSUMES A NOMINAL MISSION WITH TWO CREWMEN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5057 ABORT: 3/3

ITEM: EMU POWER/BATTERY CHARGER DIODE (4)
FAILURE MODE: SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) DIODE (4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THIS FAILURE MAY BE UNNOTICED UNTIL THE RPC FAILS. MAIN A AND MAIN B ARE TIED TOGETHER THROUGH THIS LINE. LOSS OF REDUNDANCY IS LOSS OF ABILITY TO OPERATE EMU IN THE AIRLOCK, AND CHARGE BATTERIES. LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5058 ABORT: 3/3

ITEM: EMU POWER/BATTERY CHARGER DIODE (4)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) DIODE (4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FAILURE TO SUPPLY POWER THROUGH SELECTED BUS. LOSS OF REDUNDANCY CAUSES LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5059 ABORT: 3/3

ITEM: EMU POWER/BATTERY CHARGER POWER SUPPLY (2)
FAILURE MODE: ERRATIC OPERATION, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, PARTIAL OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER (2)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, CONTAMINATION, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
FAILURE TO PRODUCE THE CORRECT OUTPUT FOR THE EMU WILL CAUSE LOSS OF MISSION. FAILURE ASSUMES A NOMINAL MISSION WITH TWO CREWMEN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/2
MDAC ID: 5060 ABORT: 3/3

ITEM: EMU POWER/BATTERY CHARGER POWER SUPPLY (2)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) MODE SWITCH (S3, S5)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	2/2	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW18H
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PEICE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FAILURE TO SWITCH EITHER FROM EMU POWER SUPPLY MODE OR BATTERY CHARGE MODE WILL CAUSE LOSS OF MISSION. FAILURE ASSUMES A NOMINAL MISSION WITH TWO CREWMEN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	8/04/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/3
MDAC ID:	5061	ABORT:	3/3

ITEM: EMU INPUT SWITCH (1)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) INPUT SWITCH (S4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW18H
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PEICE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
FAILURE TO SWITCH BETWEEN EMU 1 AND 2 FOR VOLTAGE AND CURRENT CHECK. NOT MISSION ESSENTIAL, VOLTAGE CAN BE CHECKED THROUGH THE EMU INDICATOR.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5062 ABORT: 3/3

ITEM: EMU VOLT/CURRENT INDICATOR
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) INPUT SWITCH
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL AW18H
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PEICE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL, VOLTAGE CAN BE CHECKED THROUGH THE EMU VOLTAGE INDICATOR, AND THE BATTERIES CAN BE CHARGED FOR A SPECIFIED AMOUNT OF TIME.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5063 ABORT: 3/3

ITEM: EMU POWER SUPPLY CURRENT SENSOR
FAILURE MODE: OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) CURRENT (V64C0211A, C0214A)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PEICE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL, SEE MDAC ID 5062.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5064 ABORT: 3/3

ITEM: EMU POWER SUPPLY VOLTAGE SENSOR
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) EMU POWER/BATTERY CHARGER
4) MEASUREMENTS (V64V0210A, V0213A)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL, SEE MDAC ID 5062.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5065 ABORT: 3/3

ITEM: VACUUM VENT ISOLATION VALVE (1)
FAILURE MODE: FAILS TO REMAIN OPEN, FAILS TO OPEN, PREMATURE OPERATION

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION:
PART NUMBER: 90V62LV18

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PEICE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THIS ISOLATION VALVE IS INSTALLED IN THE DEPRESSURIZATION DUCTS AND IS NORMALLY USED IN THE OPEN POSITION. FAILURE TO REMAIN OPEN PREVENTS DEPRESSURIZATION OF THE AIRLOCK USING THE DEPRESSURIZATION SYSTEM. THE AIRLOCK CAN BE DEPRESSURIZED THROUGH THE PAYLOAD BAY HATCH EQUALIZATION VALVES. LOSS OF FUNCTION LEADS TO LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 2/1R
MDAC ID: 5066 ABORT: 3/3

ITEM: VACUUM VENT ISOLATION VALVE (1)
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4)
5)
6)
7)
8)
9)

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 [2] B [F] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOMINALLY THIS FAILURE HAS NO EFFECT BUT THE ORBITER MISSION SHOULD BE TERMINATED DUE TO THE EFFECTS A DUCT LEAK COULD HAVE, SCREEN B HAS BEEN FAILED BECAUSE UPON FAILURE TO CLOSE IT IS NOT KNOWN IF THE CREW WILL HAVE ENOUGH TIME TO CORRECT FOR THE FAILURE. IT IS RECOMMENDED A MANUAL OVERRIDE BE INCLUDED IN THIS VALVE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 5067 ABORT: 3/3

ITEM: VACUUM VENT ISOL. VLV. CNTRL. SWITCH (1)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) CONTROL SWITCH (S11)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/2R	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 [2] B [F] C [P]

LOCATION: PANEL ML31C
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE VACUUM ISOLATION VALVE CANNOT BE CLOSED ON DEMAND. THE ISOLATION VALVE IS DESIGNED TO CLOSE WITHIN 2 SECONDS IN THE EVENT OF AN EXCESSIVE CABIN PRESSURE LOSS RATE AND VIA THE CABIN OXYGEN SYSTEM 1 AND 2 FLOW SENSOR CIRCUITRY. LOSS OF FUNCTION COULD LEAD TO LOSS OF LIFE AND VEHICLE. SCREEN B HAS BEEN FAILED BECAUSE UPON FAILURE TO CLOSE, IT IS NOT KNOWN IF THE CREW WILL HAVE ENOUGH TIME TO CORRECT FOR THE FAILURE.

REFERENCES: PAGE 143 OF MOOG'S COMPONENT SUMMARY

INDEPENDE[illegible] ASSESSMENT
ORBITER SUBSY[illegible]YSIS WORKSHEET

DATE: 8/04/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 5068

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/2R
ABORT: 3/3

ITEM: VACUUM VEN[illegible] CNTRL. SWITCH (1)
FAILURE MODE: FAILS TO [illegible] NTERMITTENT OPERATION,
PREMATURE OPERATION

LEAD ANALYST: R.E. DUFFY [illegible]YS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATIO[illegible]
4) CONTROL SWITCH (S11)
5)
6)
7)
8)
9)

[illegible]ITIES

FLIGHT PHASE	HDW/F[illegible]	ABORT	HDW/FUNC
PRELAUNCH:	3/[illegible]	RTLS:	3/3
LIFTOFF:	3/[illegible]	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/[illegible]	ATO:	3/3
LANDING/SAFING:	3/[illegible]		

REDUNDANCY SCREENS: A [Z] B [P] C [P]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MEC[illegible]'AL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE ISOLATION VALVE REMAINS OP[illegible], THE SWITCH CAN BE DISABLED WITH THE BUS SELECT SWITCH OR THE CIRCUIT BREAKER AND THE VALVE WILL REMAIN IN ITS OPEN POSITION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/1R
MDAC ID: 5069 ABORT: 3/3

ITEM: VACUUM VENT ISOL. VLV. BUS SELECT SWITCH (1)
FAILURE MODE: OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) BUS SELECT SWITCH (S10)
5)
6)
7)
8)
9)

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 [2] B [F] C [P]

LOCATION: PANEL ML31C
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE VACUUM ISOLATION VALVE CANNOT BE CLOSED ON DEMAND. THE ISOLATION VALVE IS DESIGNED TO CLOSE WITHIN 2 SECONDS IN THE EVENT OF AN EXCESSIVE CABIN PRESSURE LOSS RATE AND VIA THE CABIN OXYGEN SYSTEM 1 AND 2 FLOW SENSOR CIRCUITRY. LOSS OF FUNCTION COULD LEAD TO LOSS OF LIFE AND VEHICLE. SCREEN B HAS BEEN FAILED BECAUSE UPON FAILURE TO CLOSE, IT IS NOT KNOWN IF THE CREW WILL HAVE ENOUGH TIME TO CORRECT FOR THE FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5070 ABORT: 3/3

ITEM: VACUUM VENT ISOL. VLV. BUS SELECT SWITCH (1)
FAILURE MODE: FAILS TO REMAIN OPEN, INTERMITTENT OPERATION, PREMATURE OPERATION

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) BUS SELECT SWITCH (S10)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PANEL ML31C
PART NUMBER:

CAUSES:

EFFECTS/RATIONALE:
THE ISOLATION VALVE REMAINS OPEN, THE SWITCH FAILURE CANNOT OPERATE THE VALVE UNTIL THE CONTROL SWITCH IS ENGAGED. IN ADDITION THE BREAKERS CAN BE PULLED TO MAINTAIN THE ISOLATION VALVE OPEN.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5071 ABORT: 3/3

ITEM: VACUUM VENT ISOL. VLV. CIRCUIT BREAKER (2)
FAILURE MODE: OPEN (ELECTRICAL), INADVERTENTLY OPENS

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) CIRCUIT BREAKER (CB7, CB8)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PANEL ML86B
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE ISOLATION VALVE REMAINS OPEN, THIS FAILURE WILL NOT ALLOW THE VALVE TO OPERATE ON DEMAND UNLESS THE SYSTEM IS SWITCHED TO THE ALTERNATE MAIN CIRCUIT BREAKER. LOSS OF REDUNDANCY IS LOSS OF MISSION DUE TO THE POTENTIAL LIFE THREATENING SITUATION CREATED BY THE LACK OF ON-DEMAND ABILITY TO CLOSE THE ISOLATION VALVE IF A DUCT LEAK DEVELOPS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/2R
MDAC ID: 5072 ABORT: 3/3

ITEM: VACUUM VENT ISOL. VLV. CIRCUIT BREAKER (2)
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) CIRCUIT BREAKER (CB7, CB8)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/2R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PANEL ML86B
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
THE ISOLATION VALVE REMAINS OPEN, THIS FAILURE MAY DISABLE THE SWITCHES TO OPERATE THE VACUUM ISOLATION VALVE ON DEMAND. LOSS OF REDUNDANCY OR THE ABILITY TO OPERATE THE VALVE IS LOSS OF MISSION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5073 ABORT: 3/3

ITEM: VACUUM VENT ISOL. VLV. CONTROL DIODES (2)
FAILURE MODE: OPEN (ELECTRICAL), SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) INDICATOR DIODES (A8CR5 & 6)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO MISSION IMPACT. THE ISOLATION VALVE CONTROL SWITCH HAS BARBER POLE INDICATION. IN ADDITION, SHOULD THE VALVE CLOSE, THE SYSTEM WILL GIVE INDICATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5074 ABORT: 3/3

ITEM: BUS ISOLATION DIODES (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) INDICATOR DIODES (A8CR3 & 4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO MISSION IMPACT. INDICATORS WILL NOT WORK WHEN THIS BUS IS SELECTED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5075 ABORT: 3/3

ITEM: BUS ISOLATION DIODES (2)
FAILURE MODE: SHORTED

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) INDICATOR DIODES (A8CR3 & 4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: ACOUSTICS, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
MAIN A AND B ARE COUPLED, NO OTHER EFFECTS UNLESS THERE IS A SECOND FAILURE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5076 ABORT: 3/3

ITEM: BUS SELECT SENSOR (2)
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) MEASUREMENT (V62S0205E, S0206E)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL. CIRCUIT OPERATION CAN BE INDICATED THROUGH THE CONTROL VALVE INDICATORS.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5077 ABORT: 3/3

ITEM: CONTROL VALVE SWITCH INDICATOR (2)
FAILURE MODE: ERRATIC OPERATION, FAILS OUT OF TOLERANCE, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) MEASUREMENT (V62X0207E, X0208E)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL. VALVE OPERATION CAN BE VERIFIED THROUGH BARBER POLE INDICATOR, OR OTHER SYSTEM PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5078 ABORT: 3/3

ITEM: VACUUM VENT BARBER POLE INDICATOR (1)
FAILURE MODE: FALS MID-TRAVEL, FAILS TO OPEN/CLOSE, PHYSICAL BINDING/JAMMING, FAILS TO SWITCH

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) INDICATOR (DS7)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML31C
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NOT MISSION ESSENTIAL. VALVE OPERATION CAN BE VERIFIED THROUGH V62-X0207E AND X0208E INDICATORS, OR OTHER SYSTEM PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5079 ABORT: 3/3

ITEM: ISOL. VALVE SWITCH SENSOR RESISTOR (A8R5 AND A8R6) (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) SENSORS V62X0207E & 8E
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML31C
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
SENSORS V62X0207E AND V62X0208E ARE DISABLED. NOT MISSION ESSENTIAL. VALVE OPERATION CAN BE VERIFIED THROUGH BARBER POLE INDICATOR, OR OTHER SYSTEM PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5080 ABORT: 3/3

ITEM: BUS SELECT SWITCH SENSOR RESISTORS (A8R1 AND A8R2) (2)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4) SENSORS V62S0205E & 6E
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML31C
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
SENSORS V62S0205E AND V62S0206E ARE DISABLED. NOT MISSION ESSENTIAL. VALVE OPERATION CAN BE VERIFIED THROUGH THE ISOLATION CONTROL SWITCH SENSORS OR OTHER SYSTEM PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/20/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: LIFE SUPPORT FLIGHT: 3/3
MDAC ID: 5081 ABORT: 3/3

ITEM: ISOL. VALVE SENSOR POWER RESISTOR (A8R3 & 4)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) VACUUM VENT ISOLATION VALVE
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML31C
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
A8R3 AND A8R4 ARE USED TO LIMIT THE CURRENT TO THE ISOLATION VALVE POSITION INDICATORS, THEY ARE REDUNDANT. SHOULD BOTH RESISTORS FAIL, POWER TO ACTUATE THE BARBER POLE INDICATOR AND TELEMETRY SENSORS IS LOST. NOT MISSION ESSENTIAL. VALVE OPERATION CAN BE VERIFIED THROUGH OTHER SYSTEM PERFORMANCE.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	8/20/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	LIFE SUPPORT	FLIGHT:	3/3
MDAC ID:	5082	ABORT:	3/3

ITEM: DEDICATED SIGNAL CONDITIONER (83V75A18)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) SIGNAL CONDITIONER
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
POSSIBLE LOSS OF SENSORS V64P0101A AND V63P0202A. NO MISSION IMPACT.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/20/87
SUBSYSTEM: LIFE SUPPORT
MDAC ID: 5083

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: DEDICATED SIGNAL CONDITIONER (83V75A16)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: R.E. DUFFY SUBSYS LEAD: M.J. SAIIDI

BREAKDOWN HIERARCHY:
1) LIFE SUPPORT SYSTEM
2) AIRLOCK
3) SIGNAL CONDITIONER
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
POSSIBLE LOSS OF SENSOR V64P0102A & 201A, AND V64T0131A & 130A.
NO MISSION IMPACT.

REFERENCES:

APPENDIX D
POTENTIAL CRITICAL ITEMS

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
Supply Water Subsystem			
1100	2/2	H2 SEPARATOR (2)	RESTRICTED FLOW
1101	2/2	H2 SEPARATORS (2)	INTERNAL LEAKAGE
1102	2/2	H2 SEPARATORS (2)	INTERMITTENT OPERATION, PARTIAL OUTPUT
1103	2/2	H2 SEPARATORS	EXTERNAL LEAKAGE
1105	2/2	MICROBIAL FILTER (1)	EXTERNAL LEAKAGE
1106	2/2	MICROBIAL FILTER QD (2)	EXTERNAL LEAKAGE
1110	2/2	TANKS INLET ISOL VLV (4)	EXTERNAL LEAKAGE
1113	2/2	TANKS OUTLET ISOL VLV (4)	EXTERNAL LEAKAGE
1135	2/2	RELIEF VALVE, 1.5 PSID (2)	FAILS TO OPEN, RESTRICTED FLOW
1137	2/2	RELIEF VALVE, 1.5 PSID (2)	EXTERNAL LEAKAGE
1141	2/2	QD, GSE FILL/DRAIN (2)	EXTERNAL LEAKAGE
1145	2/2	TANK A PRESS CNTL VLV (1)	FAILS TO OPEN
1147	2/2	TANK A PRESS CNTRL VALVE (1)	PHYSICAL BINDING
1148	2/2	TANK A PRESS CNTL VLV (1)	EXTERNAL LEAKAGE
1149	2/2	TANK A VENT VALVE (1)	FAILS TO CLOSE, INTERNAL LEAKAGE, PHYSICAL BINDING
1151	2/2	TANK A VENT VALVE (1)	EXTERNAL LEAKAGE
1154	2/2	CROSSOVER VALVE (1)	EXTERNAL LEAKAGE
1167	2/2	ISOL VLV, FES B LINE (1)	EXTERNAL LEAKAGE
1178	2/2	GALLEY SUPPLY VALVE (1)	FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE
1179	2/2	GALLEY SUPPLY VALVE (1)	FAILS TO REMAIN OPEN, FAILS TO OPEN
1180	2/2	GALLEY SUPPLY VALVE (1)	EXTERNAL LEAKAGE
1181	2/2	SOLENOID, GALLEY VLV (1)	FAILS TO CLOSE, OPEN (ELECTRICAL), SHORTED
1182	2/2	SOLENOID, GALLEY VALVE (1)	FAILS TO OPEN, OPEN (ELECTRICAL), SHORTED
1183	2/2	SWITCH, GALLEY VALVE (1)	PHYSICAL BINDING
1184	2/2	SWITCH, GALLEY VALVE (1)	OPEN (ELECTRICAL), ANY SINGLE CONTACT, FAILS TO SWITCH
1185	2/2	SWITCH, GALLEY VALVE (1)	SHORTED, ANY SINGLE CONTACT

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
Supply Water Subsystem (cont'd)			
1189	2/2	CB, GALLEY VALVE (1)	FAILS TO REMAIN CLOSED, OPEN (ELECTRICAL)
1191	3/2R	DUMP ISOL VALVE (1)	FAILS TO REMAIN OPEN, FAILS TO OPEN, RESTRICTED FLOW
1193	2/1R	DUMP ISOL VALVE (1)	EXTERNAL LEAKAGE
1204	3/2R	DUMP VALVE (1)	FAILS TO REMAIN OPEN, FAILS TO OPEN, RESTRICTED FLOW
1205	3/2R	DUMP VALVE (1)	FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE
1206	3/2R	DUMP VALVE (1)	EXTERNAL LEAKAGE
1210	2/1R	SWITCH, DUMP VALVE (1)	SHORTED, ANY SINGLE CONTACT
1221	2/2	NOZZLE HEATER (1)	OPEN (ELECTRICAL)
1222	2/2	NOZZLE HEATER (1)	SHORTED
1223	2/2	DUMP NOZZLE	RESTRICTED FLOW
1228	2/2	QD, CONT X-TIE (1)	FAILS TO REMAIN CLOSED, FAILS TO CLOSE, INTERNAL LEAKAGE
1229	2/2	QD, CONT X-TIE (1)	FAILS TO REMAIN OPEN, FAILS TO OPEN
1231	3/2R	QD, ECLSS BAY (2)	RESTRICTED FLOW
1232	3/2R	QD, GALLEY/DISPENSER (2)	RESTRICTED FLOW
1233	2/2	LINES AND FITTINGS	EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)
1234	2/2	LINES AND FITTINGS	EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)
1235	2/2	LINES AND FITTINGS	EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)
1236	2/2	LINES AND FITTINGS	EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)
1237	2/1R	WATER CHILLER (1)	INTERNAL LEAKAGE, WCL-H2O
1238	3/2R	WATER CHILLER (1)	RESTRICTED FLOW, POTABLE WATER

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
Waste Water Subsystem			
2008	2/2	URINAL ADAPTER QR (1)	MISALIGNMENT
2013	2/2	TUBE, EMU EXTENSION (1)	RESTRICTED FLOW
2014	2/2	TUBE, EMU EXTENSION (1)	EXTERNAL LEAKAGE
2015	2/2	EMU QD (1)	EXTERNAL LEAKAGE
2041	2/2	WCS TO WWS QD (1)	EXTERNAL LEAKAGE
2042	2/2	WCS TO WWS LINE (1)	EXTERNAL LEAKAGE
2043	2/2	WCS TO WWS DYNATUBE (1)	EXTERNAL LEAKAGE
2111	2/2	WWS LINE AND JUNCTIONS	EXTERNAL LEAKAGE
2112	2/2	WWS LINE AND JUNCTIONS	RESTRICTED FLOW, CLOSED
2113	2/2	ARS CONDENSATE SPLY TUBE (1)	EXTERNAL LEAKAGE
2114	2/2	ARS CONDENSATE SPLY TUBE (1)	RESTRICTED FLOW, CLOSED
2116	2/2	WASTE TANK INLET VALVE (1)	EXTERNAL LEAKAGE
2136	2/2	DUMP LINES AND FITTINGS	EXTERNAL LEAKAGE
2137	2/2	DUMP LINES AND FITTINGS	RESTRICTED FLOW, BLOCKED FLOW
2138	2/2	WTNK DUMP ISOL VLV (1)	EXTERNAL LEAKAGE
2139	2/2	WTNK DUMP ISOL VLV (1)	RESTRICTED FLOW, FAILS TO OPEN
2141	2/2	QD/TP @ HIGH CAP. FILTER (2)	EXTERNAL LEAKAGE
2142	2/2	HIGH CAP FILTER (1)	RESTRICTED FLOW, BLOCKED FLOW
2144	2/2	CONT H2O X-TIE QD/PLUG (1)	INABILITY TO MATE OR DE-MATE, FAILS TO OPEN, RESTRICTED FLOW
2145	2/1R	WASTE TANK 1 DUMP VLV (1)	EXTERNAL LEAKAGE
2147	2/1R	WASTE TANK 1 DUMP VLV (1)	FAILS TO CLOSE
2171	2/2	CB, WWS DMP ISOL VLV (1)	FAILS TO REMAIN CLOSED
2173	2/2	CB, WWS DMP ISOL VLV (1)	SINGLE CONTACT OPEN (ELECTRICAL)
2174	2/2	CB, WWS DMP ISOL VLV (1)	SINGLE CONTACT SHORTED
2175	2/2	CB, WWS DMP ISOL VLV (1)	PHYSICAL BINDING JAMMING
2176	2/2	CB, WWS DMP ISOL VLV (1)	OPEN (ELECTRICAL)
2177	2/2	CB, WWS DMP ISOL VLV (1)	SHORTED
2181	2/1R	CB, DMP LINE HTR (1)	FAILS TO REMAIN CLOSED
2195	2/1R	SW, WWS DMP VLV (1)	SINGLE CONTACT OPEN (ELECTRICAL)
2196	2/1R	SW, WWS DMP VLV (1)	SINGLE CONTACT SHORTED
2197	2/1R	SW, WWS DMP VLV (1)	PHYSICAL BINDING
2198	2/1R	SOLENOID WWS DMP VLV (1)	OPEN (ELECTRICAL)
2199	2/1R	SOLENOID WWS DMP VLV (1)	SHORTED
2207	1/1	CREW MODULE LINE (1)	EXTERNAL LEAKAGE
2208	1/1	INTERNAL LINE AND FITTINGS	EXTERNAL LEAKAGE

LAC-ID	FLIGHT	IT	FAILURE MODE
Waste Water Subsystem (cont			
3209	1/1	EXTERNAL ND FITTING	EXTERNAL LEAKAGE
210	1/1	DYNATU T	EXTERNAL LEAKAGE
211	1/1	VACUUM (1)	RESTRICTED FLOW
213	2/1R	VACUUM HTR THER	FAILS TO REMAIN CLOSED
214	2/1R	VACUUM VE EATER (2)	OPEN (ELECTRICAL), SHORTED
3218	1/1	CB, NOZZLE HEATER (1)	FAILS TO REMAIN CLOSED
3219	1/1	SW, NOZZLE HE (1)	OPEN (ELECTRICAL)
3220	1/1	SW, NOZZLE HEA 1)	SHORTED CLOSED
3222	1/1	VACUUM VE R (1)	OPEN (ELECTRICAL), SHORTED
Sm e Detection and Fire S bsystem			
3001	2/1R	CB, SMO	OPEN (ELECTRICAL), SHORTED
3003	2/1R	CB, SMOK	OPEN (ELECTRICAL), SHORTED
3005	2/1R	CB, SMOKE DETN CABIN (1)	OPEN (ELECTRICAL), SHORTED
3007	1/1	CB-FIRE SUPP N (3)	OPEN (ELECTRICAL)
3011	2/2	SW, SMK DE ESET (1)	PHYSICAL BINDING/ JAMMING, OPEN (ELECTRICAL), FAILS TO SWITCH, JAMMED IN MAINTAINED
3012	2/2	SW, SMF ESET (1)	SHORTED, ONE CONTACT FAILS TO OPEN AFTER CLOSURE
3014	2/2	SW, SMO CIRCUIT ST	PHYSICAL BINDING/ JAMMING, FAILS TO SWITCH, SHORTED, FAILED IN A OR B POSITION ONE C
3017	2/2	DIODE (3)	OPEN (ELECTRICAL)
3025	2/1R	RESISTOR A6R2 (CABIN)	SHORTED, SHORTED TO GROUND
3029	2/1R	RESISTOR A1P1	SHORTED, SHORTED TO GROUND
3044	1/1	SW, FIRE AV BAY (3)	PHYSICAL BINDING/ JAMMING, OPEN (ELECTRICAL), FAILS TO SWITCH

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
Smoke Detection and Fire Suppression Subsystem (cont'd)			
3046	1/1	RESISTOR (2.2K)	SHORTED, SHORTED TO GROUND
3048	1/1	SW, FIRE SUPPR AV BAY DISCH (3)	PHYSICAL BINDING/ JAMMING, OPEN (ELECTRICAL), FAILS TO SWITCH
3052	1/1	DIODE	OPEN (ELECTRICAL)
3056	1/1	PYRO CONTROLLER (3)	LOSS OF OUTPUT
3057	2/2	PYRO CONTROLLER NO. (3)	PREMATURE OPERATION
3058	2/1R	SMOKE DETECTOR (9)	LOSS OF ALL OUTPUT
3059	2/2	FIRE SUPPRESSANT ASSY (9)	EXTERNAL LEAKAGE, PREMATURE OPERATION
3060	1/1	FIRE SUPPRESSANT ASSY (9)	FAILS TO OPERATE
3065	1/1	HYBRID DRIVER (TYPE II) (3)	OPEN (ELECTRICAL), LOSS OF OUTPUT, SHORTED
Airlock Support System			
5003	2/2	EMU WATER SUPPLY VLV (2)	FAILS TO OPEN
5005	2/2	EMU WATER SUPPLY VLV (2)	EXTERNAL LEAKAGE
5006	2/2	SW, EMU WATER SUPPLY (2)	OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT
5009	2/2	CB, EMU WATER SUPPLY (1)	FAILS TO REMAIN CLOSED
5011	2/2	EMU WASTE WATER VLV (2)	FAILS TO OPEN
5014	2/2	SW, EMU WASTE WATER (2)	OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT
5017	2/2	CB, EMU WASTE WATER (1)	FAILS TO REMAIN CLOSED
5019	2/2	SUPPLY AND WASTE COUPLINGS (4)	EXTERNAL LEAKAGE
5020	2/2	SUPPLY LINES AND FITTING	EXTERNAL LEAKAGE
5022	2/1R	O2 SUPPLY LINES	EXTERNAL LEAKAGE
5025	2/2	EMU O2 SUPPLY VALVE (2)	FAILS TO OPEN
5027	2/1R	EMU O2 SUPPLY VALVE (2)	EXTERNAL LEAKAGE
5028	2/1R	EMU O2 SUPPLY COUPLINGS	EXTERNAL LEAKAGE
5029	2/2	DEPRESS CAP VENT (1)	FAILS TO OPEN, PHYSICAL BINDING/ JAMMING
5030	2/2	CAP VENT DEBRIS SCREEN (1)	PHYSICAL BINDING/ JAMMING
5031	2/2	CAP VENT DEBRIS SCREEN (1)	RESTRICTED FLOW
5033	2/2	DEPRESS VALVE (1)	FAILS TO OPEN
5035	2/1R	AIRLOCK TO CABIN VENT CAP (2)	FAILS TO OPEN, PHYSICAL BINDING/ JAMMING, RESTRICTED FLOW

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
Airlock Support System (cont'd)			
5037	2/1R	AIRLOCK TO CABIN FILTER (2)	RESTRICTED FLOW
5039	2/1R	EQUALIZATION VALVE (2)	FAILS TO OPEN, RESTRICTED FLOW
5041	2/2	EQUALIZATION VALVE (2)	EXTERNAL LEAKAGE
5043	2/2	PRESSURE DIFFERENTIAL (2)	EXTERNAL LEAKAGE
5052	2/2	EQUALIZATION VALVE (2)	EXTERNAL LEAKAGE
5055	2/2	BUS SELECT SWITCH (2)	OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT
5056	2/2	REMOTE POWER CNTLR (4)	INTERMITTENT OPERATION, ERRONEOUS OUTPUT, PARTIAL OUTPUT, FAILS OPEN
5059	2/2	POWER SUPPLY (2)	ERRATIC OPERATION, INTERMITTENT OPERATION, ERRONEOUS OUTPUT, PARTIAL OUTPUT, OPEN (ELECTRICAL)
5060	2/2	POWER SUPPLY (2)	OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT
5066	2/1R	VACUUM VENT ISOL VLV (1)	FAILS TO CLOSE
5067	3/1R	SW, ISOL VLV CNTRL (1)	OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT
5069	3/1R	SW, ISOL VLV BUS SELECT (1)	OPEN (ELECTRICAL), FAILS TO SWITCH, OPEN, SINGLE CONTACT