INDEPENDENT ORBITER ASSESSMENT

ANALYSIS OF THE REACTION CONTROL SYSTEM Vol. 1 of 3

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MCDONNELL DOUGLAS ASTRONAUTICS COMPANY HOUSTON DIVISION

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INDEPENDENT ORBITER ASSESSMENT ANALYSIS OF THE REACTION CONTROL SYSTEM

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Independent Orbiter Assessment Analysis of the Reaction Control System

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 <u>NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986</u>. The IOA approach features a top-down analysis of the hardware to determine failure modes, criticality, and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. This report documents (Appendix C) the independent analysis results for the Reaction Control System.

Although the aft Reaction Control System (RCS) and Orbital Maneuvering System (OMS) are housed in the same pod, this report only addresses the RCS, both aft and forward. The OMS report addresses the analysis of the OMS separately.

The purpose of the RCS is to provide thrust in and about the X, Y, Z axes for External Tank (ET) separation; orbit insertion maneuvers; orbit translation maneuvers; onorbit attitude control; rendezvous; proximity operations (payload deploy and capture); deorbit maneuvers; and abort attitude control. The RCS is situated in three independent modules, one forward in the orbiter nose and one in each OMS/RCS pod. Each RCS module consists of the following subsystems:

- o Helium Pressurization Subsystem
- o Propellant Storage and Distribution Subsystem
- o Thruster Subsystem
- o Electrical Power Distribution and Control Subsystem

Figure 1 presents a summary of the failure criticalities for each of the major divisions of the RCS. A summary of the number of failure modes, by criticality, is also presented below with Hardware (HW) criticality first and Functional (F) criticality second.

Summary of	IOA Fa	ailure	Modes	By Cri	ticali	ty (Hw	/F)
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number :	70	106	137	288	448	1223	2272

										ELECTRICAL POWER	DISTRIBUTION &	CRIT. #FM #PCI	ſ	49	3/1R 268 127	1174	TOTAL 2064 449	
	TOTAL	2272	590		#PCI	24	- 9	11	27								VIIIMAA Trausfitas (2 Maa Aft Põõg	
	3/3	1223		TED CI	/1∟11 00 #FM	24	- 4	30	32									
RCS ANALYSIS SUMMARY	3/2R	448	146		CRIT	1/1	2/1R 2/2	3/1R 3/2R	TOTAL							Y		
SIS SI	3/1R	288	131							T					Ŵ	- Car		
NALY	2/2	137	137		5						/	1Q	R		AA THAVATTA (3) MCI PROPELLANT	Y	Î	a comonent
RCS A	2/1R	106	106	STORAGE &	×PCI	40	31	₩	83			ar i		4		2	A H	ALL PRESUMEATION COMPANY
	1/1	7 0	7 0	LANT SI	× NOTO	40	31	* 10	130		Ľ	Al.	K		5	_		N
	CRIT.	₩J₹	₽ CI	PROPELLANT S	CRIT.	1/1	2/1R 2/2	3/1R 3/2R	TOTAL								1	
L				<u> </u>						RIZATION	#PCI	9 9 2	7 4	11	I	31		ат тем
										M PRESSURIZ	*FM	9.5 9.5	2 i I 1	~ -	œ	46	CUIDCAUTY	PAILURE MODE POTENTIAL CRITICAL ITEM
										HELIUM PRESSURIZATION	CRIT.	1/1	2/2	3/1R 3/2R	3/3	TOTAL	CRIT	•••

Figure 1 - RCS OVERVIEW ANALYSIS SUMMARY

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

Summary	of]	IOA Pot	ential	. Criti	.cal It	.ems (HW/F)
Criticali	Lty:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
Number	:	70	106	137	131	146	590

Of the failure modes analyzed, 307 could potentially result in a loss of life and/or loss of vehicle.

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 divide 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 FMEA/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 RCS Ground Rules and Assumptions

The RCS specific ground rules and assumptions used in the IOA analysis are presented in Appendix B.

3.0 SUBSYSTEM DESCRIPTION

3.1 Functional and Hardware Description

The Shuttle Orbiter includes three RCS packages, one forward and two aft, one in each of the left and right OMS/RCS pods (Figure 2). Each RCS package consists of the following subsystems:

- o Helium Pressurization
- o Propellant Storage and Distribution
- o Thruster
- o Electrical Power Distribution and Control

Figures 3 through 6 present an overview of the RCS breakdown hierarchy utilized in this analysis.

During a typical Shuttle mission, the RCS jets are used during External Tank (ET) separation, orbit insertion, orbital operations, deorbit maneuver, and entry. The Aft RCS (ARCS) is active from prelaunch through the transition to aerosurface control during entry. The Forward RCS (FRCS) is active from prelaunch through the post-deorbit propellant dump and is disabled for entry. Figures 7 and 8 are hardware schematics of the FRCS and ARCS, respectively.

The RCS jets are first used in the mission after Main Engine Cutoff (MECO) to maintain vehicle attitude until ET separation. The RCS provides a translation maneuver during ET separation to ensure Orbiter separation from the ET. The RCS is also used to control roll in the event of the failure of two main engines during ascent.

After OMS-1 burn cutoff, the vehicle goes into attitude hold. The crew uses the Translational Hand Controller (THC) to command RCS translational maneuvers to null any residual velocity. Attitude hold is maintained until the maneuver to OMS-2 burn attitude which is performed manually by the crew using the Rotational Hand Controller (RHC). The RCS +X jets can be used to complete either the OMS-1 or OMS-2 burns or to perform the OMS-2 burn entirely in the case of OMS engine failures. In this case, the OMS-to-RCS interconnect capability will be used to feed OMS propellant to the four +X RCS thrusters.

Once in orbit, after the OMS-2 burn is completed, RCS maneuvers are performed to control the vehicle attitude according to the flight plan. For onorbit attitude control the crew may select either primary or vernier jets.

During deorbit, the RCS is used to maneuver to the OMS deorbit burn attitude, null any residual velocity, dump excess propellant for center-of-gravity control, and maneuver to the Entry Interface (EI) attitude. In case both OMS engines malfunction,

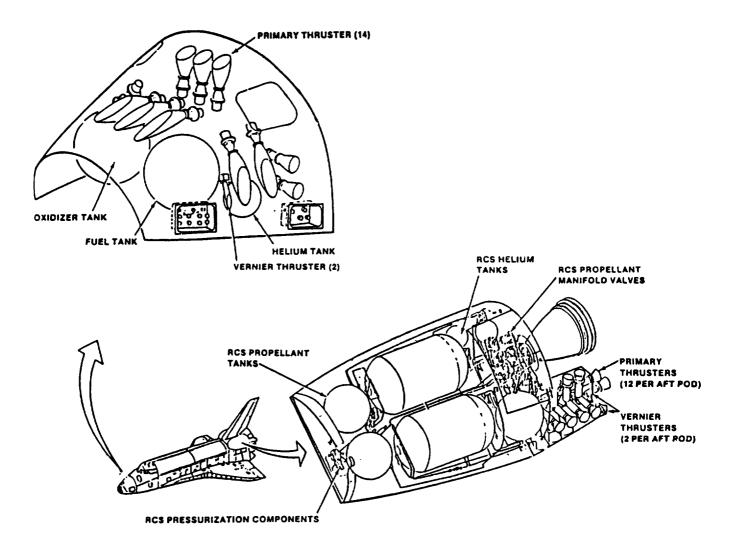


Figure 2 - REACTION CONTROL SYSTEM (RCS)

INJECTOR COMBUSTION BIPROPELLANT PRIMARY AND **VERNIER JETS** SOLENOID THRUSTERS CHAMBER VALVES NOZZLE THRUSTER Subsystem ۱ 1 t FORWARD REACTION CONTROL MANIFOLD ISOLATION LINES AND BELLOWS **PROPELLANT TANKS PRESSURE RELIEF** TANK ISOLATION **PROPELLANT STORAGE** SYSTEM HARDWARE PROPELLANT COUPLINGS AND DISTRIBUTION PROPELLANT VALVES VALVES VALVES SUBSYSTEM HELIUM COUPLINGS HELIUM PRESSURE HELIUM ISOLATION HELIUM TANKS HELIUM CHECK HELIUM LINES REGULATORS **PRESSURIZATION** SUBSYSTEM VALVES VALVES HELIUN

Figure 3 - FORWARD RCS HARDWARE BREAKDOWN HIERARCHY

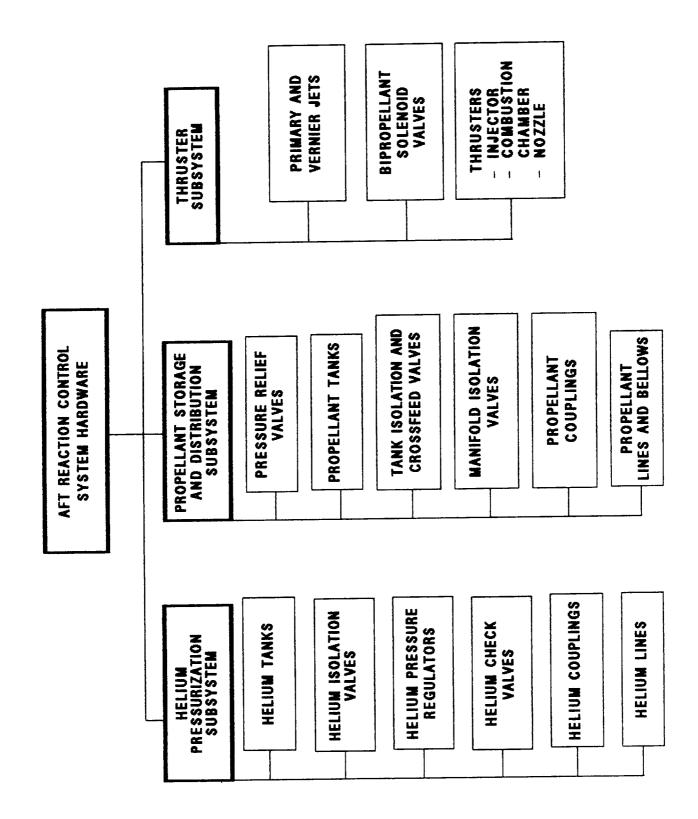


Figure 4 - AFT RCS HARDWARE BREAKDOWN HIERARCHY

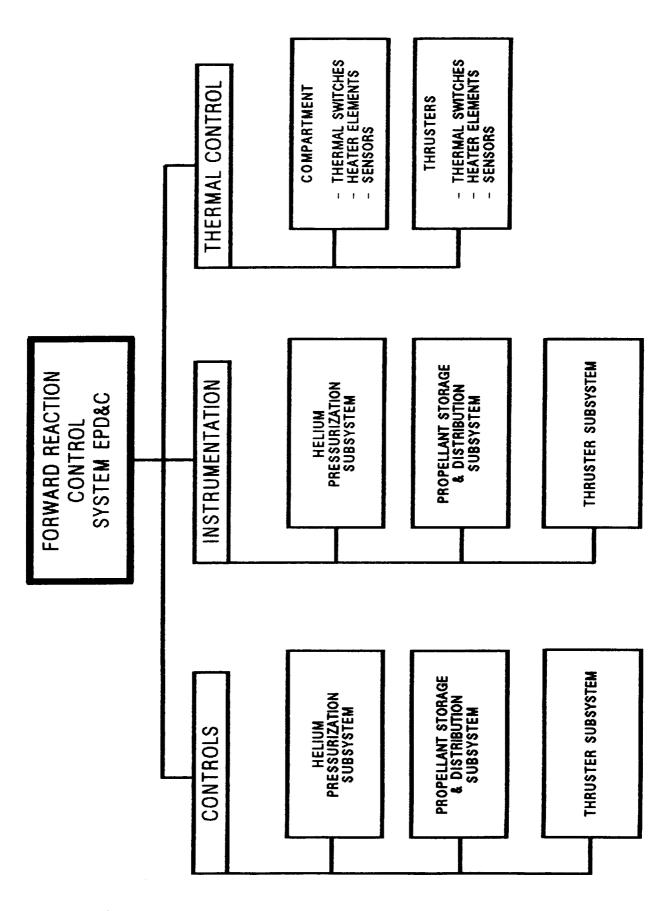


Figure 5 - FORWARD RCS EPD&C BREAKDOWN HIERARCHY

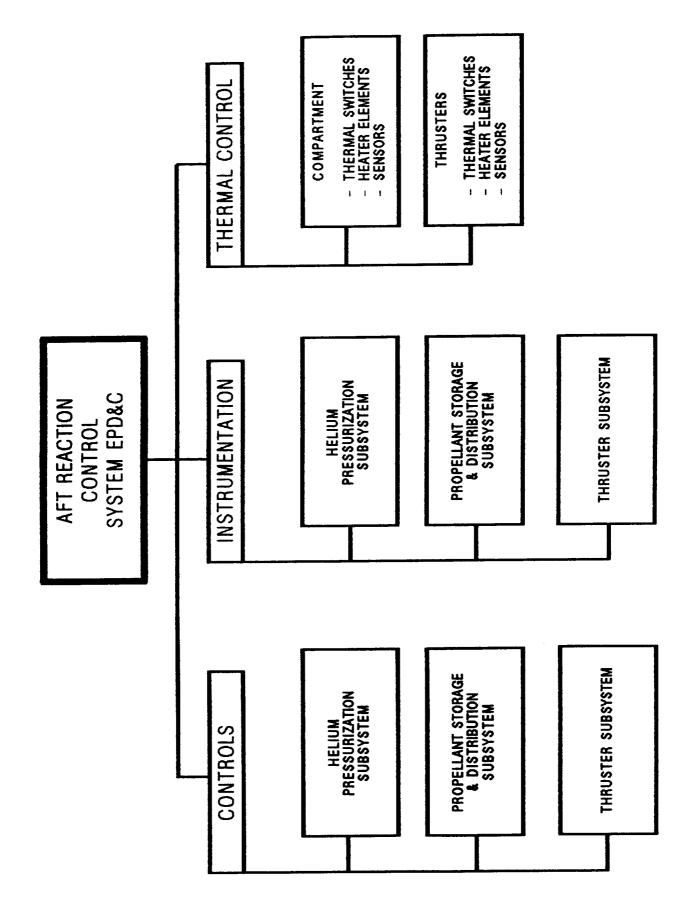


Figure 6 - AFT RCS EPD&C BREAKDOWN HIERARCHY

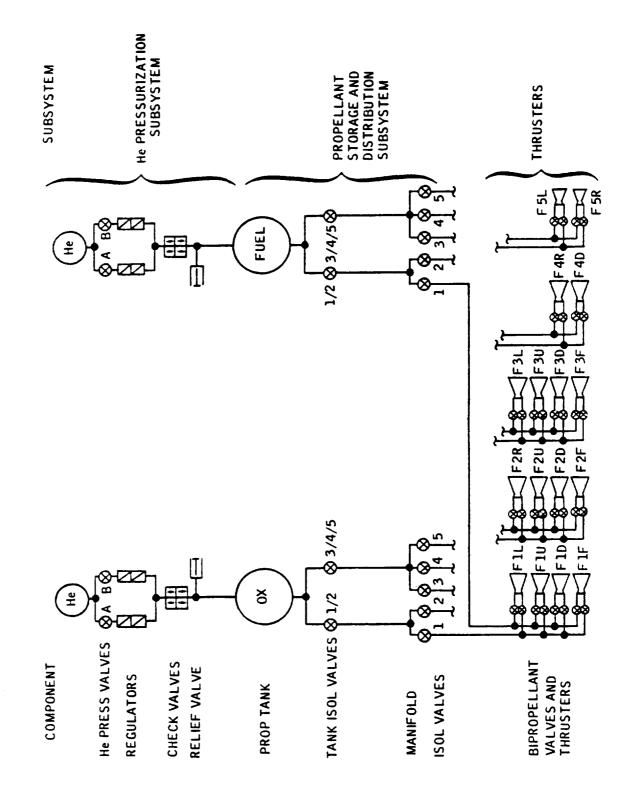


Figure 7 - FORWARD RCS SCHEMATIC

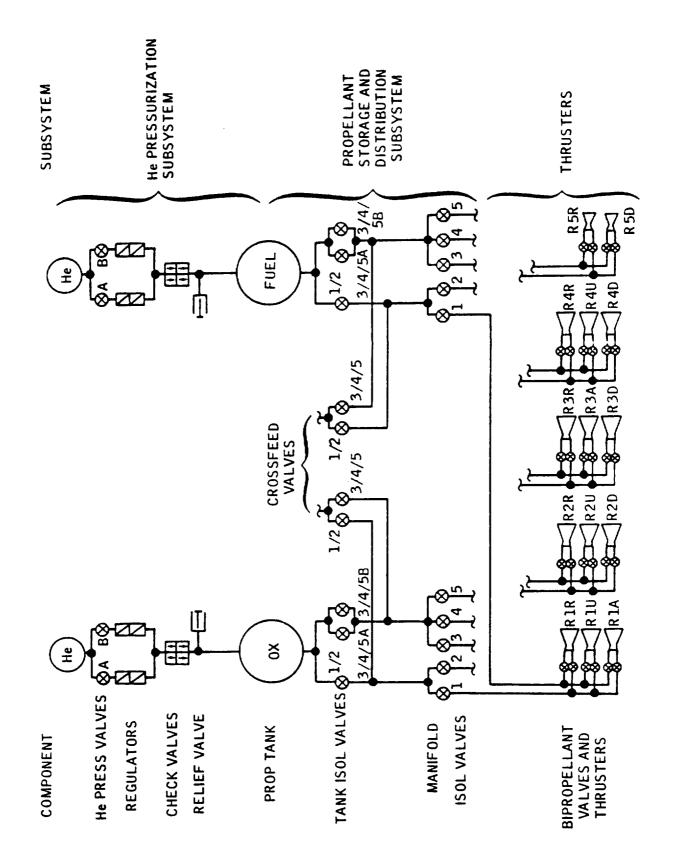


Figure 8 - AFT RCS SCHEMATIC

the RCS can be used to perform or complete the deorbit burn. In this case, the OMS-to-RCS interconnect will be selected to feed OMS propellant to the four +X RCS thrusters.

Once the deorbit burn is completed, the vehicle is maneuvered to the EI attitude.

From EI (400,000 ft) to approximately 262,000 ft, the vehicle is controlled in roll, pitch, and yaw with the ARCS jets. The GPCs disable the roll thrusters below this altitude, since the vehicle is captured and stable in the roll axis. Shortly after entering blackout, the pitch thrusters are disabled. From this time on, the elevons are used to control pitch and banking. The yaw thrusters are still used to assist the rudder. This mode of control will be used until the vehicle slows to Mach 1 where the yaw thrusters are disabled. Total vehicle control is then accomplished by the aerodynamic control surfaces through landing.

3.1.1 Helium Pressurization Subsystem

The pressurization subsystem regulates and distributes helium to the propellant tanks. This subsystem consists of two helium storage tanks, isolation valves, pressure regulators, check valves, and the lines necessary for filling, draining, and distributing the helium.

3.1.1.a Helium Storage Tanks

The high pressure helium supply is contained in two 1.761 cubic ft spherical storage tanks in each module. The tanks are made of a titanium liner overwrapped with fiberglass. One tank supplies helium pressure to the fuel propellant tank while the other helium tank supplies pressure to the oxidizer propellant tank. The helium tank's maximum operating pressure is 4000 psig and is proof-pressure tested to 4480 psig.

3.1.1.b Helium Isolation Valve

For each propellant there are two helium isolation valves in parallel between the helium tanks and the pressure regulators which are used to isolate the highpressure gaseous helium from the remainder of the pressurization subsystem (Figure 9).

The helium isolation valves are operated by two solenoids, one of which is momentarily energized to magnetically latch the valve open. The second solenoid magnetically unlatches the valve, allowing spring and helium pressure to force the valve closed.

The switching logic for the helium isolation valves is contained in the Forward and Aft Load Control Assemblies (FLCA and ALCA). Solenoid and power logic

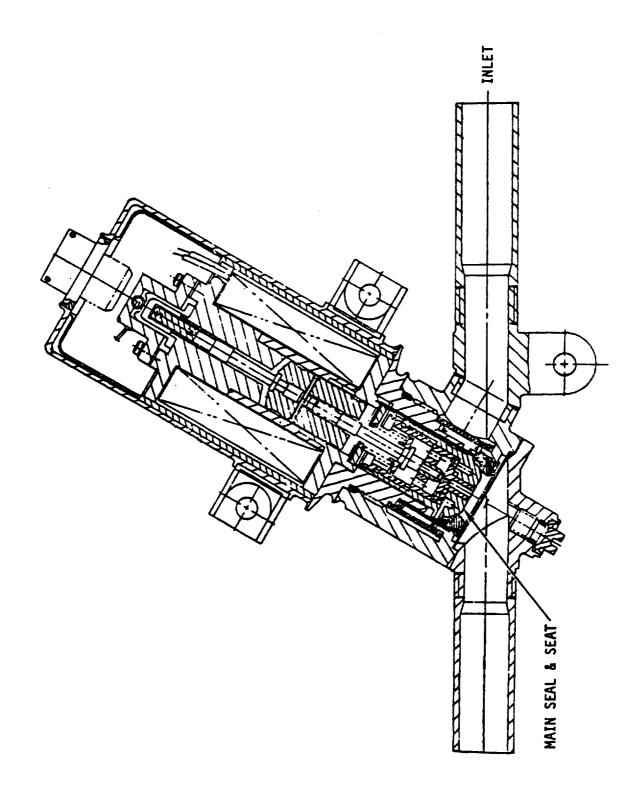


Figure 9 - HELIUM ISOLATION VALVE

is provided by the Power Control Assemblies (PCA), which are located within the LCAs. The LCAs and PCAs must be powered up in order to operate the helium isolation valves.

The helium isolation valves are controlled by the FWD RCS, AFT LEFT RCS, and AFT RIGHT RCS HE PRESS A/B switches on panels 07 and 08. These are permanent position switches (OPEN, GPC, CLOSE), but only apply momentary power to the solenoid due to the logic in the LCA. Each switch controls two isolation valves, one in the helium oxidizer line and one in the helium fuel line.

These valves contain microswitches which are activated when the valves are fully open or closed. When commanded, the switch logic allows a one-second delay for the valves to reach the command position before sending a position indication signal to the GPCs, telemetry, and a position indicator (talkback) above each switch. Power is then removed from the solenoids. The talkback logic displays barberpole when the valves are in motion or when there is a position mismatch between the fuel and oxidizer helium valves. Otherwise, the talkback shows OP for open valves and CL for closed valves.

The GPC can command the isolation valve to open and close to maintain the system pressurization and to prevent overpressurization when the isolation valve switch is in the GPC position. In the event of a switch failure in the GPC position, the crew can open or close the valves using the GPC memory read/write procedures.

The valve's nominal operating pressure is 200 to 4000 psig and limits the flow to 81 scfm.

3.1.1.c Pressure Regulator Assembly

Helium pressure regulation is accomplished by two regulator assemblies connected in parallel and located downstream of each helium isolation valve (Figure 10). Each assembly contains two regulators, primary and secondary, connected in series so that if the primary regulator fails open, the secondary regulator can regulate the pressure within acceptable limits. The regulators cannot be controlled manually or by the GPC.

The primary and secondary regulators regulate the tank pressure to 245 psig and 256 psig, respectively. The flow rate is limited to 81 scfm for 500 to 1400 psig inlet pressure, and 150 scfm for 1400 to 4000 psig inlet pressure.

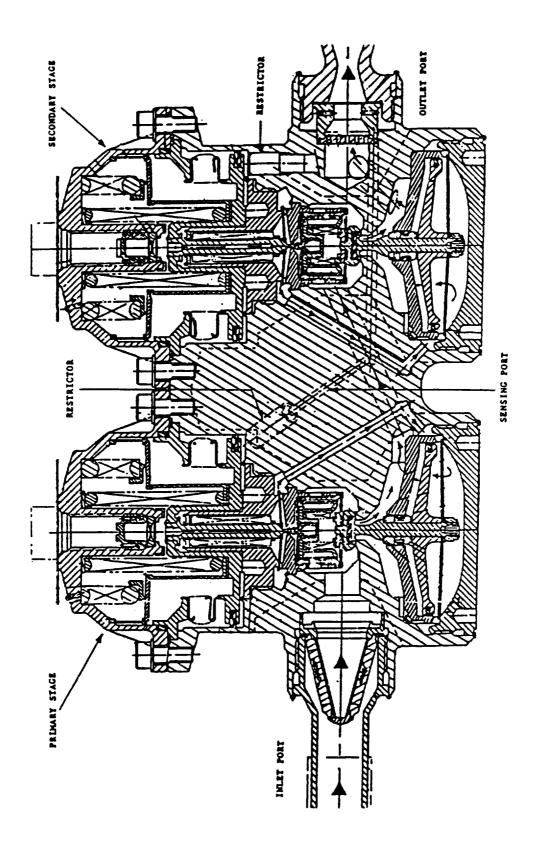


Figure 10 - HELIUM PRESSURE REGULATOR ASSEMBLY

3.1.1.d Check Valve Assembly

A check valve assembly, located between the pressure regulator assemblies and each relief valve, is used to preclude backflow of helium or propellant vapors or liquids (Figure 11). Each assembly contains four independent check valves connected in series-parallel. The check valves cannot be controlled manually or by the GPC.

The valve's normal operating pressure is 355 psig, with a maximum of 370 psig.

3.1.2 Propellant Storage and Distribution Subsystem

The propellant subsystem distributes the fuel and oxidizer to the thrusters. This subsystem consists of propellant tanks, pressure relief valves, tank isolation valves, crossfeed valves, manifold isolation valves, and the lines and couplings necessary for filling, draining, and distributing the propellant.

3.1.2.a Propellant Tanks

Each RCS module contains two titanium 39.2-inch spherical propellant tanks, one for fuel and one for oxidizer (Figure 12). Each tank contains an internally-mounted surface-tension screen Propellant Acquisition Device (PAD) which acquires and delivers the propellant to the RCS thrusters on demand. The surfacetension device also prevents the helium pressurant gas from entering the propellant or the propellant distribution lines prior to propellant depletion. The forward propellant tanks have PADs which are designed to operate primarily in a low-g environment. The aft propellant tanks are designed to operate in both high and low-g regimes.

3.1.2.b Pressure Relief Valve Assembly

The helium pressure relief valve assembly is located between each check valve assembly and the propellant tank, and will vent excess pressure overboard before it can over pressurize the propellant tanks (Figure 13). The assembly consists of a burst diaphragm, filter, and relief valve. The burst diaphragm is of the nonfragmentation type, but the filter is further insurance that fragmentation or particles will not reach the relief valve seat. The relief valve cannot be controlled manually or by the GPC.

The burst disk ruptures at 332 psig. The relief valve reseats at 310 psig.

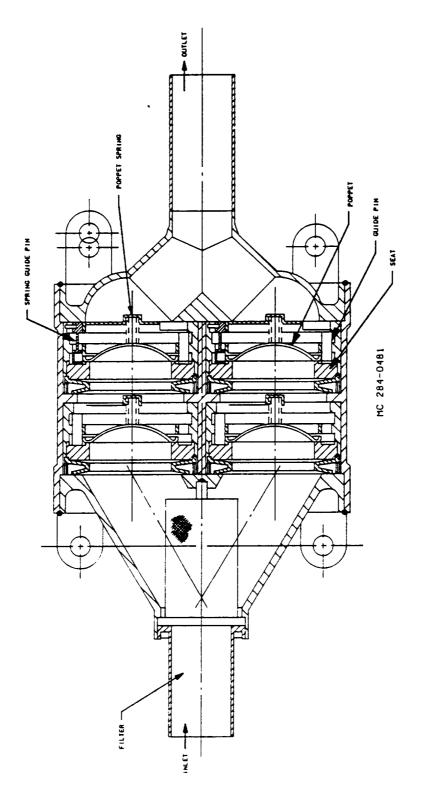


Figure 11 - QUAD CHECK VALVE ASSEMBLY

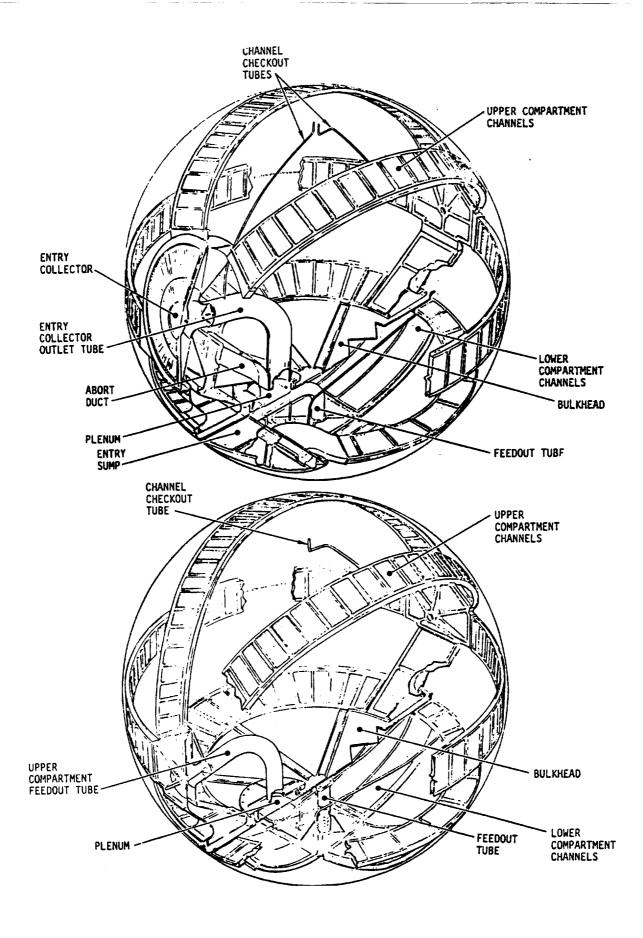


Figure 12 - AFT AND FORWARD RCS PROPELLANT TANKS

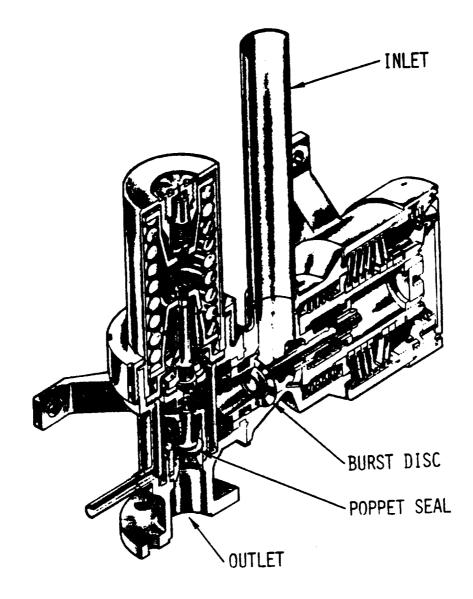


Figure 13 - PRESSURE RELIEF VALVE ASSEMBLY

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3.1.2.c Tank Isolation, Crossfeed, and Manifold 1/2/3/4 Isolation Valves

The RCS propellant tank isolation, crossfeed, and manifold 1/2/3/4 isolation values are all AC motor values. Once a value reaches the open or closed position, an open or close microswitch is automatically closed to remove AC power from the value motor. A signal is also sent to the GPC, to the ground, and to the value position indicator (talkback), located above each switch. The talkback logic displays barberpole when the values are in motion or when there is a position mismatch between the fuel and the oxidizer values. Otherwise, the talkback shows "OP" for open values and "CL" for closed values.

The tank isolation values are located between the propellant tanks and the manifold isolation values, and are used to isolate the propellant tanks from the remainder of the subsystem (Figure 14).

The tank isolation values are AC motor-operated and contain a lift-off ball-flow control device. For each module, one value isolates each propellant tank from the 1/2 manifold. Two values in parallel isolate each propellant tank from the 3/4/5 manifold line in the aft modules, and one value isolates each propellant tank from the 3/4/5 manifold line in the forward module.

The tank isolation valves are controlled by the FWD RCS, AFT LEFT RCS, and AFT RIGHT RCS TANK ISOLATION 1/2 and 3/4/5 switches on panels 07 and 08. These are permanent position switches (OPEN, GPC, CLOSE). Switch logic, relay logic, and motor logic for the isolation valves are contained in the Forward and Aft Motor Control Assemblies (FMCA and AMCA). Therefore, it is necessary to have the MCAs powered up to operate the tank isolation valves.

The tank isolation valves are normally maintained open throughout the mission with the switch in the GPC position. With the switch in the GPC position, the logic in the MCA is designed to receive computer commands to control the valves. The GPC reconfigures the aft tank isolation valves and the RCS and OMS crossfeed valves in case of OMS-to-RCS interconnect, or for RCS/RCS crossfeed operations. Manual configuration is required in the case of manual RCS/RCS crossfeed and on orbit/deorbit OMS-to-RCS interconnect. In the event of a switch failure in the GPC position, the crew can open or close the valves using GPC memory read/write procedures.

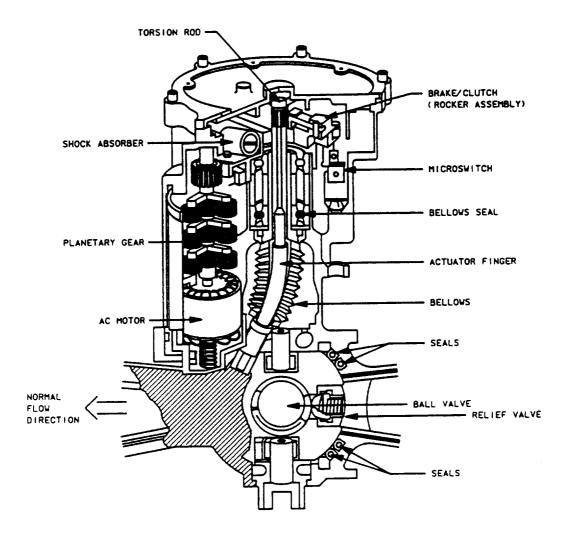


Figure 14 - AC MOTOR VALVE

The RCS crossfeed valves are contained only in the ARCS pods, and are used to isolate the RCS propellant cross-feed lines from the OMS interconnect lines (Figure 14). They are located between the tank isolation valves and the manifold isolation valves.

The RCS crossfeed valves are AC motor-operated and contain a lift-off ball-flow control device. One pair of valves, one fuel and one oxidizer valve, isolate the RCS crossfeed lines from the 1/2 propellant lines. One pair of valves isolate the RCS crossfeed lines from the 3/4/5 propellant lines. The RCS crossfeed valves are controlled by the LEFT, RIGHT RCS CROSSFEED 1/2 and 3/4/5 switches on panel O9. These are permanent position switches (OPEN, GPC, CLOSE). Switch logic, relay logic, and motor logic for the isolation valves are contained in the AMCA. Therefore, it is necessary to have the MCAs powered up to operate the RCS crossfeed valves.

The RCS crossfeed values are normally maintained closed throughout the mission, with the switch in the GPC position. With the switch in the GPC position, the logic in the MCA is designed to receive computer commands to control the values. The GPC reconfigures these values, the OMS crossfeed values, and the tank isolation values in case of OMS-to-RCS interconnect during aborts, or for RCS/RCS crossfeed operations. Manual configuration is required in the case of manual RCS/RCS crossfeed and on orbit/deorbit OMS-to-RCS interconnect. In the event of a switch failure in the GPC position, the crew can open or close the values using GPC memory read/write procedures.

The primary manifold isolation values are located between the tank isolation values, downstream of the RCS crossfeed values, and the primary thrusters (Figure 14). They are used to isolate the primary thrusters from the propellant subsystem.

The primary manifold isolation valves are AC motoroperated and contain a lift-off ball flow control device. For each module, one valve isolates each manifold from each propellant. The primary manifold isolation valves are controlled by the FWD RCS, AFT LEFT RCS, and AFT RIGHT RCS MANIFOLD ISOLATION 1, 2, 3, and 4 switches on panels 07 and 08. These are permanent position switches (OPEN, GPC, CLOSE). Switch logic, relay logic, and motor logic for the isolation valves are contained in the FMCA and AMCA. Therefore, it is necessary to have the MCAs powered up to operate the manifold isolation valves. Redundancy Management (RM) is used to monitor the microswitches in these valves, and can cause the valves to be declared closed, and the jets on that manifold to be removed from the Jet Available Table. The crew can override the RM by CRT keyboard entries and reselect the manifold and its jets.

The primary manifold isolation valves are normally maintained open throughout ascent and entry, with the switch in the GPC position. With the switch in the GPC position, the logic in the MCA is designed to receive computer commands to control the valves. These valves are controlled by the GPC during aborts and are controlled by RM at all times. In the event of a switch failure in the GPC position, the crew can open or close the valves using GPC memory read/write procedures.

3.1.2.d Vernier Manifold Isolation Valves

The vernier manifold isolation values are located between the tank isolation values, downstream of the RCS crossfeed values, and the vernier thrusters (Figure 15). They are used to isolate the thrusters from the propellant subsystem.

The vernier manifold isolation valves are DC solenoid operated. One valve isolates each vernier manifold from each propellant. The manifold isolation valves are controlled by the FWD RCS, AFT LEFT RCS, and AFT RIGHT RCS MANIFOLD 5 ISOLATION switches on panels 07 and 08. These are permanent position switches (OPEN, GPC, CLOSE). Switch logic for the vernier manifold valves is contained in the FLCA and ALCA. Solenoid logic and power logic is provided by the Power Control Assemblies (PCAs). Therefore, it is necessary to have the LCAs powered up to operate the manifold isolation valves.

Once a valve reaches the open or closed position, a microswitch is automatically closed to remove DC power from the valve solenoid. A signal is also sent to the GPC, to the ground, and to the valve position indicator (talkback) located above each switch. The talkback logic displays barberpole when the valves are in motion or when there is a position mismatch between the fuel and the oxidizer valves. Otherwise, the talkback shows "OP" for open valves and "CL" for closed valves. Redundancy Management (RM) is used to monitor the microswitches in these valves, and can cause the valves to be declared closed, and the vernier jets to be deselected. The crew can override the RM by CRT keyboard entries and reselect the vernier jets.

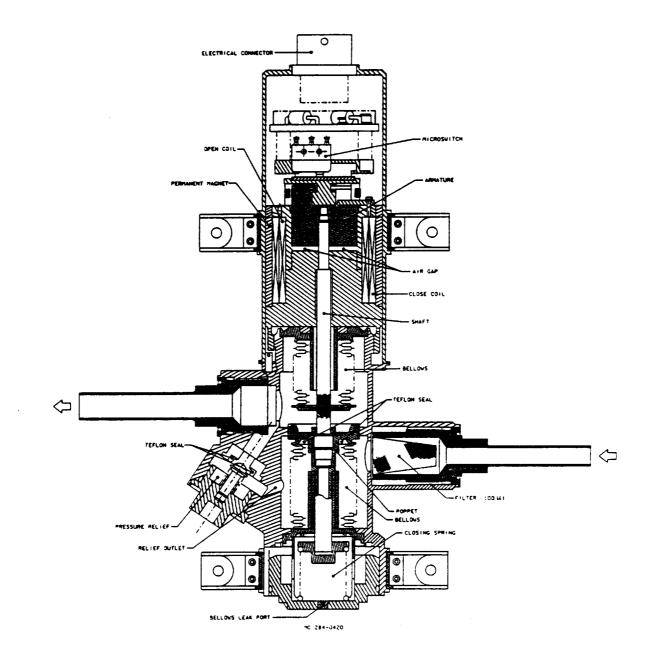


Figure 15 - VERNIER MANIFOLD ISOLATION VALVE

The vernier manifold isolation valves are normally maintained open throughout orbit and closed during ascent and entry, with the switch in the GPC position. With the switch in the GPC position, the logic in the LCAs and PCAs is set up to receive computer commands to control the valves. The GPC controls these valves by RM at all times. In the event of a switch failure in the GPC position, the crew can open or close the valves using the GPC memory read/write procedures.

3.1.3 Thruster Subsystem

The RCS jet thrusters are pressure-fed, bipropellant, hypergolic engines. There are two types of thrusters in the Shuttle: the primary thrusters, and the vernier thrusters (Figure 16). Both types of thrusters contain a fuel and oxidizer bipropellant solenoid valve, injector head assembly, combustion chamber, expansion nozzle, and an electrical junction box and can be operated in either pulse mode or steady-state mode.

3.1.3.a Bipropellant Valves

The bipropellant control valves control the flow of propellants to the thrusters by opening and closing in response to electrical fire commands (Figure 17). Each primary jet engine assembly contains two injector solenoid pilot poppet valves, one for fuel and one for oxidizer. They are operated by coaxially-wound coils which are energized open by a fire command, and are spring-loaded closed. When the pilot valves open, the propellant's hydraulic pressure opens the main poppet valves to allow the propellants into the injector. The vernier jets use single-stage, solenoid-operated poppet valves.

The fuel and oxidizer values on the primary jet thrusters are mechanically linked. The pilot value is activated by a 80 msec pulse sent from the Reaction Jet Driver. Commands are issued every 80 msec, so the minimum on or off time is 80 msec. The vernier bipropellant values are operated similarly by a mechanically linked torque motor.

During normal operations, if the isolation and manifold valves are properly configured, a fire command to a jet will cause that jet's bipropellant valves to open. Removal of the fire command will cause the bipropellant valves to close.

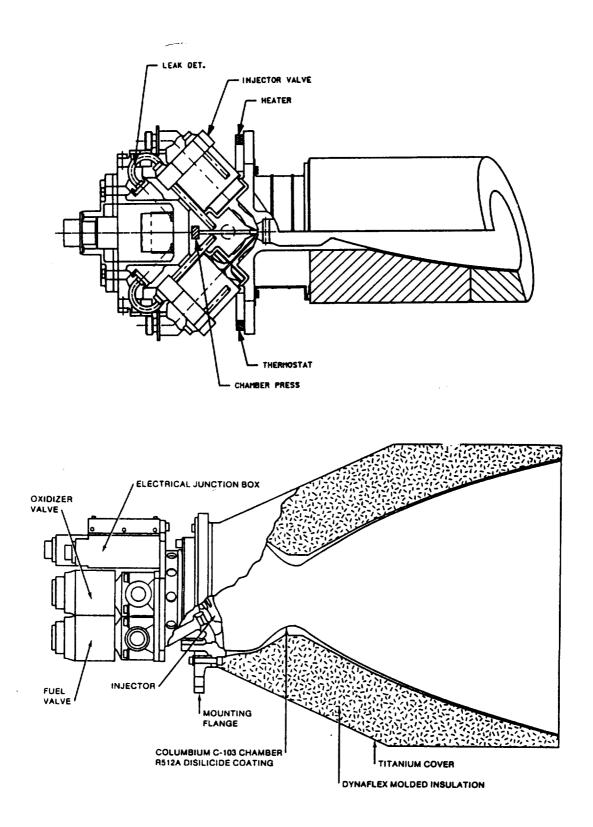
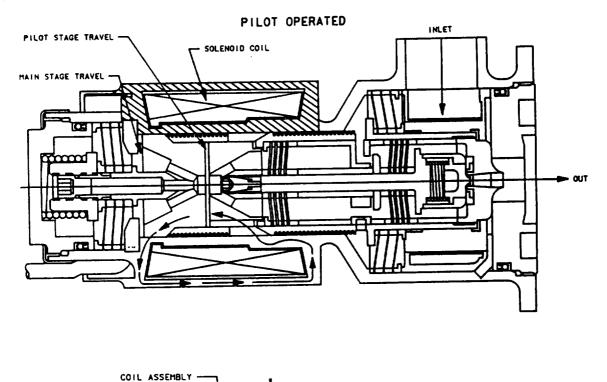


Figure 16 - VERNIER AND PRIMARY THRUSTERS



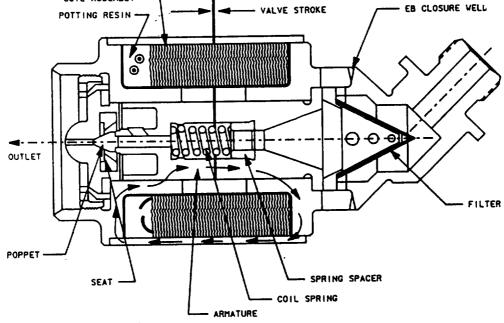


Figure 17 - PRIMARY AND VERNIER THRUSTER VALVES

3.1.3.b Injector Head Assembly

Each RCS jet contains an injector head assembly which directs the propellant flow from the bipropellant control valves to the combustion chamber (Figure 18). The injector is welded to the combustion chamber.

For the primary jets, injector holes are arranged in two concentric rings (outer fuel, inner oxidizer) which are canted to cause impingment of the hypergolic propellants within the combustion chamber. Separate fuel holes near the outer edge of the injector plate provide cooling for the combustion chamber wall. Spaced between these fuel inlet holes are acoustic cavities which are of varied depth to prevent acoustic resonance when the jet is fired.

For the vernier jets, fuel and oxidizer enter the combustion chamber through a single pair of injector holes which are also canted to provide impingment of the fuel and oxidizer streams for combustion. The combustion chamber wall is cooled by making the fuel stream more divergent than the oxidizer stream.

Unlike stream impingment is used to improve propellant mixing in the combustion chamber with a mixture ratio of 1.6 lbs oxidizer to 1.0 lbs fuel for both the primary and vernier jets.

The primary jets operate at 152 psia, produce 870 lbs (vacuum) thrust, and have a specific impulse of 280 seconds. The vernier jets operate at 106 psia, produce 25 lbs (vacuum) thrust, and have a specific impulse of 265 seconds.

3.1.3.c Combustion Chamber and Nozzle

The combustion chamber and nozzle are made of columbium C-103 with a R512A Disilicide coating 0.003-inches thick. Behind the columbium is Dynaflex molded insulation covered with 0.02-inch thick titanium on the outside.

3.1.4 Electrical Power Distribution and Control Subsystem

3.1.4.a Electrical Junction Box

The electrical junction box on each RCS thruster contains an electric heater and thermostat, a chamber pressure transducer, a propellant leak detection device, and the electrical connections to the bipropellant valves. The electrical heater contains one heating element and is thermostatically controlled.

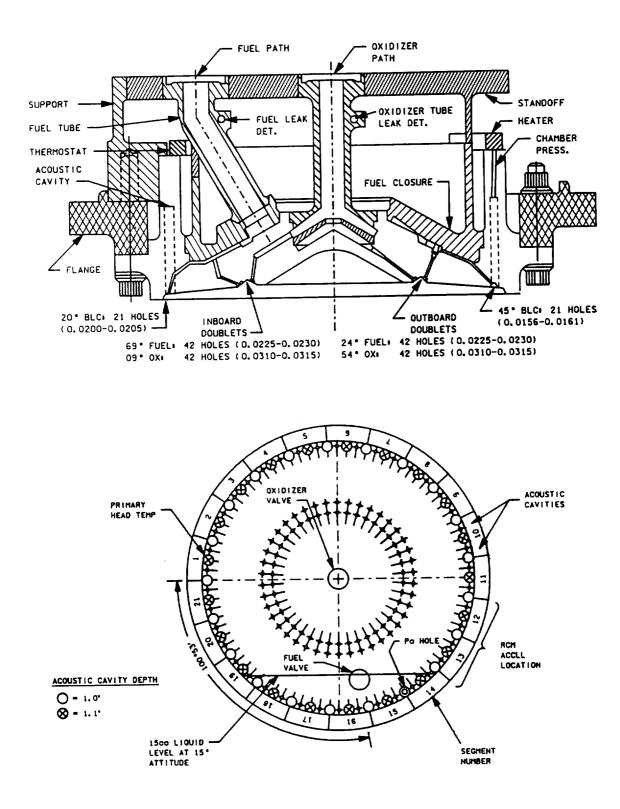


Figure 18 - INJECTOR HEAD ASSEMBLY

The thermostat is set to a predetermined range, and will regulate the on and off cycles of the heater as long as voltage is present. The heaters are controlled by the RCS/OMS HEATERS switches on panel Al4. These are two-position switches, OFF and AUTO, and the heater is controlled by the thermostat when this switch is in the AUTO position.

3.2 Redundancy Management

The RCS Redundancy Management (RM) monitors the RCS jets' chamber pressures, temperatures, reaction jet driver output discretes and jet fire commands, and manifold valves status. It also provides a limited amount of automatic jet deselection and alerts the crew when a fault is detected.

The Data Processing System (DPS) software provides status information on I/O errors to the RCS RM software, referred to as commfaults (communications faults). Commfault indicators are set as the result of bus masking, Bus Control Element (BCE) bypasses, and Bus Terminal Unit (BTU) bypasses. When an I/O error is detected on a BCE chain by any GPC, the data on the entire chain is flagged as invalid (commfaulted) for the applications software. On subsequent transactions, if the problem is isolated, only the faulty element is flagged as invalid. In a similar way, if a bus mask is set all BCEs and data associated with that bus is indicated via commfault as being in error. In any case, the commfault will be set or latched when it is present for two consecutive passes.

Commfaults are included in the RCS RM requirements to help prevent the redundant GPCs from moding to dissimilar software, to optimize the number of jets available for use, and to prevent the RCS RM from generating additional alerts to the Flight Control Operational Software (FCOS) generated alerts associated with commfaults. The RCS RM uses the MDM and Line Replaceable Unit (LRU) commfaults (where LRU is defined to be either one RCS jet or one RCS manifold), and will reconfigure for commfaults, regardless of whether the commfault is permanent, permanent and subsequently removed, or transient. The MDM and LRU commfaults are set in the FCOS software when a commfault is present for two cycles. There are 44 jet LRU commfaults and 15 manifold LRU commfaults.

All input signals associated with any one LRU (where LRU is defined as either one RCS jet or one RCS manifold) will be within the same BCE, and the FCOS will set a BCE flag for a BCE if it determines an I/O problem at the BCE level. This flag will be used by the manifold status monitor in determining the commfault state of the RCS LRU, and/or input signals for the LRU. A jet with an LRU commfault will not have any of its status flags or counters modified as long as the fault exists, except by subsequent crew action. An MDM commfault will set all LRU commfaults for each BCE associated with the MDM commfault, thus suspending the operation of the RCS RM failure monitors. An I/O reset on a CRT keyboard will reset any latched commfaults. LRU commfaults or transducer failures will cause the quantity monitor to use substitute measurements or constants, and the CRTs will shown on "M" to indicate missing data. If a substitute is not available or a constant is used, the calculations are suspended, a down arrow appears on the CRT, and a class 3 alarm is output.

All input signals associated with an LRU are required to be within the same BCE. The input signals associated with each RCS jet are a chamber pressure discrete, fuel and oxidizer injector temperatures, and reaction jet driver output discrete. The input signals associated with each manifold are the open and close discretes for the fuel and oxidizer manifold isolation valves.

3.2.1 Jet Failed-On Monitor

The Jet Failed Monitor uses the Reaction Jet Driver (RJD) output discretes and the jet fire command discretes provided by the RCS CMD SOP to detect jets failed on.

The Jet Failed-On Monitor uses the jet fire command A discretes, the reaction jet driver output discretes, the jet RM inhibit discretes, and the jet LRU commfault discretes as inputs, and outputs the jet failed-on indicator discretes and the jet failed on counter discretes. There are 44 of each of these discretes.

The Jet Failed-On Monitor's logic ANDs the reaction jet driver output discrete with the complement of the jet fire command A discrete, and declares the jet failed-on if this calculation is true for three consecutive cycles. Consecutive passes are not affected by commfaults or by cycles in which there are fire commands for the affected jets. The three consecutive cycle logic will be reset; however, if the noncommanded jet has its reaction jet driver output discrete reset to indicate the jet is not firing. A jet failed-on declaration will not cause automatic deselection of the jet by RM, nor will the Digital Autopilot (DAP) reconfigure the Jet Priority Table.

A jet failed-on determination will set the jet failed-on indicator discrete and the jet failed-on counter discrete. These discretes will be reset when the associated jet's RM inhibit discrete is reset. The Jet Failed-On Monitor outputs the jet failed-on indicators to displays and controls and to the Jet Fault Limit Module.

The Jet Failed-On Monitor's design is valid for a minimum jet fire command pulse of 80 msec on and 80 msec off. The crew will be alerted by a class 2 alarm, the backup C&W lights and RCS jet light on the C&W matrix on panel F7, a fault message on the CRT fault message line, and jet-on indications on the RCS SPEC display and the GNC SYS SUM 1 and 2 displays.

The Jet Failed-On Monitor is active in OPS 1, 2, 3, 6, and 8 in the PASS, and 1, 3, and 6 for the BFS, but only if BFS is engaged.

3.2.2 Jet Failed-Off Monitor

The Jet Failed-Off Monitor uses the jet fire command discretes provided by the RCS Command SOP, and the jet chamber pressure feedback discretes provided by the RJDs to detect jets failed off.

The Jet Failed-Off Monitor uses the jet fire command A discretes, the jet chamber pressure discretes, the jet RM inhibit discretes, and the jet LRU commfault discretes as inputs, and outputs the jet failed-off indicator discretes and the jet failed-off counter discretes. There are 44 of each of these discretes.

The Jet Failed-Off Monitor's logic ANDs the jet fire command A discrete with the complement of the jet chamber pressure discrete, and declares the jet failed off if this calculation is true for three consecutive cycles. Consecutive passes are not affected by commfaults or by cycles in which there are no fire commands for the affected jets. However, consecutive passes leading to a failed-off indication must begin anew if, prior to reaching the third consecutive cycle, the fire command and its associated pressure discrete indicates that the jet has fired. The RCS RM will automatically deselect a jet which has failed off, and the DAP will reconfigure jet selection accordingly. (See section 3.6.1 for the DAP Jet Select Logic description.)

A failed-off jet determination will set the associated jet failed-off indicator and the jet failed-off counter discretes. These discretes will be reset when the associated jet's RM inhibit discrete is reset. The Jet Failed-Off Monitor outputs these jet failed-off indicator discretes to the Jet Fault Limit Module and to displays and controls. The Jet Failed-Off Monitor will be inhibited for the jet which has failed off until the crew resets the RM inhibit discrete.

The Jet Failed-Off Monitor design is valid for a minimum jet fire command pulse mode of 80 msec on and 80 msec off. The crew is alerted to a failure by a class 2 alarm, the backup C&W light and RCS jet light on the C&W matrix on panel F7, a fault message on the CRT fault message line, and a jet-off indication on the RCS SPEC display and the GNC SYS SUM 1 and 2 displays. The Jet Failed Off Monitor is active in OPS 2, 3, 6, and 8 in the PASS, and 1, 3, and 6 for the BFS, but only if BFS is engaged.

3.2.3 Jet Leak Monitor

The Jet Leak Monitor uses the jet fuel and oxidizer injector temperature transducer outputs of each jet to detect a leaking jet.

The Jet Leak Monitor uses the jet fuel and oxidizer injector temperatures, the jet RM inhibit discretes, and the jet LRU commfault discretes as inputs, and outputs the jet failed leak indicator discretes and the jet failed leak counter discretes. There are 44 of each of these discretes.

The Jet Leak Monitor's Logic compares the jet fuel and oxidizer injector temperatures with the specified temperature limit of 30 degrees F, and declares the Jet Failed Leak if either of the temperatures are less than 30 degrees F for three consecutive cycles. Consecutive passes leading to a Jet Failed Leak indication will begin anew if the fuel and oxidizer temperatures are both greater than 30 degrees F before the jet leak counter reaches three. The RCS RM will automatically deselect a jet which is declared leaking and the DAP will reconfigure jet selection accordingly.

A Jet Failed Leak determination will set the associated jet failed leak indicator and jet failed leak counter discretes. These discretes will be reset when the associated jets RM inhibit discrete is reset. The Jet Leak Monitor outputs the Jet Failed Leak indicator discretes to the Jet Fault Limit Module and to crew displays.

The crew is alerted to a failure by a class 2 alarm, the backup C&W light and the RCS jet light on the C&W matrix on panel F7, a fault message on the CRT fault message line, and a Jet Failed Leak indication on the RCS SPEC display and the GNC SYS SUM 1 and 2 displays.

The Jet Leak Monitor is active in OPS 2, 3, and 8 for the PASS, and 1, 3, and 6 for the BFS, but only if BFS is engaged.

3.2.4 Jet Fault Limit Module

The Jet Fault Limit module limits the number of jets which can be automatically deselected in response to failures detected by RCS RM. The limits are modifiable by crew input on the RCS SPEC display (RCS F, L, R Jet Fail Limit integers - one integer per pod). This module also reconfigures a jet's availability status (jet deselect output discretes (44)) in response to crew inputs on the RCS SPEC display (jet RM inhibit discretes (44) and jet deselect input discretes (44)).

An automatic deselection of a jet occurs if all of the following are satisfied:

- Jet Failed-Off or Jet Failed Leak (Jet Failed-On failures do not result in automatic deselection)
- o Jet select/deselect status is "SELECT"
- o Jet's manifold status is "OPEN"
- o RM is not inhibited for this jet
- o Jet failure has not been overridden
- The number of automatic deselections of primary jets on this pod is less than the associated Jet Fail Limit (no limit on vernier jets)

All jet failures detected will be announced to the crew even if they do not cause automatic jet deselection. If multiple failures occur on a jet, only the last failure will be annunciated. Failure indicators are the same as in the Jet Failed Off and Jet Failed Leak Monitors.

The jet fail limit counter is incremented by the number of jets which have been automatically deselected for that pod by the RCS RM and is decremented by one for each automatically deselected jet that is reselected. The vernier jets do not increment or decrement the jet fail limit counter. The Jet Fail Limit valves are individually changeable in major modes 2 and 3 on the RCS SPEC display. An increase in the Jet Fail Limit allows previously failed jets to be deselected, providing the above requirements are met. A descrease in the Jet Fail Limit will not cause a change in the status of any jet. Note that setting the Jet Fail Limit equal to or less than the number of jets which have been automatically deselected will effectively inhibit the RCS RM for that pod.

A jet's status can be changed from deselect to select only by item entry on the RCS SPEC page. Failure resets or reductions in the Jet Fail Limit will not cause the status to be reset to select. The select item entries cause the override to be invoked if there is a declared failure for that jet, and will make those failures inoperative in the Jet Fault Limit module. An overridden failure will remain overridden until the applicable failure is reset.

Automatic deselection of a jet can be prevented by the use of the Inhibit item entries on the RCS SPEC page. Changing the Inhibit to Not Inhibited will reset a jet's failures, but will not cause the Jet Fail Limit to be incremented or decremented. Reset by use of the RM Inhibit of a failure which has been overridden will reset the override. Jet failures are unordered; that is, if there are more candidates for automatic deselection than is permitted by the Jet Fail Limit, there is no preference as to which of the candidates will be deselected.

3.2.5 Manifold Status Monitor

The Manifold Status Monitor uses the open and close discretes of the oxidizer and fuel manifold isolation valves (provided by the monitor control assemblies) to determine the open/close status for each jet manifold.

The Manifold Status Monitor uses the fuel and oxidizer manifold valve open discretes (15 of each discrete), the fuel and oxidizer close discretes (15 of each), the manifold status discrete (15 discretes), the manifold LRU commfault discretes (15 discretes), the MDM commfault discretes (8 discretes), and the manifold status override discrete (one discrete) as inputs, and outputs the manifold open/close status discretes (15 discretes), the RCS manifold RM dilemma discretes (15 discretes), and the RM power fail discrete (one discrete).

The Manifold Status Monitor monitors the open and close discretes for each manifold for any changes of state. A change of state in any one or more of these discretes will cause a redetermination of that manifold's open/close status, independent of status changes made by the crew. This redetermination also contains logic which will determine if a power failure has occurred and will determine whether a dilemma exists on a manifold (tables 3-I and 3-A power failure condition exists when all of the open II). and close discretes on a manifold are false for three consecutive cycles, and will cause the RM Power Fail Flag to The manifold sets identified in Table 3-II are the be set. only manifolds which require power failure determination. This flag will remain set until the GNC FDA module honors it, when it will then be reset. There is only one RM Power Fail Flag and all manifolds are capable of setting it, but each can set the flag only once. Whenever a dilemma exists for three consecutive passes, the RCS manifold RM Dilemma Flag for that manifold will be set. MDM or LRU commfaults will not modify the dilemma pass counter or the RM Dilemma The flag will be reset, however, if any of the four Flag. manifold open/close discretes change state.

+-		LOC	GICAL ST	TATE OF	 ?:		RCS		
-	INF	INPUT DISCRETES		NPUT DISCRETES				MANIFOLD STATUS	MANIFOLD
_	OPE	EN	CLOSE		CLOSE				RM DILEMMA
	Fuel	Ox.	Fuel	Ox.	POWER FAILURE				
Ť	0	0	0	0	Yes	(Previous)	No		
	0	0	0	0	No	Close	NO		
	0	0	0	1	N/A	Close	NO		
	0	0	1	0	N/A	Close	No		
	0	0	1	1	N/A	Close	No		
	0	1	0	0	N/A	Close	Yes		
	0	1	0	1	N/A	Close	Yes		
	0	1	1	0	N/A	Close	Yes		
	0	1	1	1	N/A	Close	No		
	1	0	0	0	N/A	Close	Yes		
	1	0	0	1	N/A	Close	Yes		
	1 1 1 1	0	1	0	N/A	Close	Yes		
		0	1	1	N/A	Close	NO		
	1 1 1	1	0	0	N/A	Open	NO		
	1	1	0	1	N/A	Open	NO		
		1	1	0	N/A	Open	NO		
	1	1	1	1	N/A	Close	Yes		

TABLE 3-I - MANIFOLD STATUS

The manifold status from the previous pass is to be maintained.

TABLE 3-II MANIFOLD SETS FOR POWER FAILURE DETERMINATION

ο	Forward No. 3 and Forward No. 4
0	Aft Left No. 1 and Aft Right No. 1
o	Aft Left No. 2 and Aft Right No. 2
0	Aft Left No. 3 and Aft Right No. 3
0	Aft Left No. 4 and Aft Right No. 4

The transition of an MDM commfault discrete from false to true will cause the status of all affected manifolds to be set to close in all major modes. In major mode 1, the same is true of an LRU commfault. In major modes 2 and 3, the transition of an LRU commfault will cause no change in manifold statuses.

The crew is able to override the status of all manifolds on an individual basis by item entries on the RCS SPEC display via the Manifold Status Override. The setting of this discrete for a manifold will change the manifold's status to its complementary state and will then reset the discrete. The use of the Manifold Status Override feature will not inhibit or modify any of the other functions of the manifold status monitor. The module will continue to honor subsequent changes in the affected manifold's input signals (open/close discretes, commfaults, override discrete) as specified in this section.

The Manifold Close Status Override is used in Major Modes 1 and 3 open all manifolds whose status is closed and whose open/close discretes are in dilemma. This discrete can be set by item entry on the Override page, and will be reset to false after the reconfiguration is complete. The use of the Manifold Close Status Override feature will not inhibit or modify any of the other functions of the Manifold Status Monitor.

3.2.6 Available Jet Status Table

The Available Jet Status table module provides a list of jets available for use to the Jet Select Logic Module in the Flight Control System software.

The Available Jet Status Table uses the manifold open/close discretes (15 discretes) from the Manifold Status Monitor, and the jet deselect output discretes (44 discretes) from the Jet Fault Limit Module as inputs, and outputs the jet available discretes (44 discretes) and the jet status change discrete (one discrete).

The Available Jet Status Table's logic "AND"s the jet deselect output discrete with the manifold open/close status discrete and statuses a jet as available to the Flight Control System if the discretes indicate select and open, respectively. The Available Jet Status Table will be computed each time that the jet status change discrete is true.

In the BFS, jet failures are detected only when BFS is engaged. The Jet Failed Leaking and Jets Failed-Off detection in the BFS is the same as in the PASS, but the jet chamber pressure feedback discrete is used for Jet Fail-On detection in the BFS rather than the RJD output discrete which is used in the PASS.

3.3 Interfaces and Locations

The RCS interfaces with the following systems: Data Processing System, Displays and Controls, Caution and Warning, Orbital Maneuvering System, Electrical Power Distribution and Control, and the Pulse Code Modulator. In addition, the RCS interfaces with the crew.

3.3.1 Data Processing System

The RCS sends data consisting of pressures, temperatures, and valve positions to the Data Processing System (DPS) through the flight-critical Multiplexer Demultiplexers (MDMs) to have the data processed by the GPCs. The GPCs use this data to monitor and display the configuration and status of the RCS. The GPCs also provide valve configuration commands to the RCS and jet on/off commands to the RCS via the Reaction Jet Drivers Aft and Forward (RJDA and RJDF).

The Flight Control software uses the RCS Digital Automatic Pilot (DAP) to hold attitude or to accomplish an attitude maneuver by virtue of an error correction method. The State Estimator takes IMU data from the Attitude Processor software (ATT PROC), filters it, and sends it to a module called RCS Errors Phase Plane. In the RCS Errors module, attitude commands coming from the hand controller or from the Universal Pointing software (which runs the display by the same name) are compared with the actual attitude as computed by the State Estimator. The result is an attitude error and rate error which are passed on to the Phase Plane The Phase Plane Module generates positive or module. negative rate commands for each axis. These commands are sent to the RCS Activity Lights and to the Jet Select module.

The Jet Select Module uses a look-up table to determine how many jets are needed from each directional cluster. (A "directional cluster" is a group of jets located within the same pod, forward, left, or right, which provide thrust in the same axis and direction.) There are several such tables which take into account jet failures, propellant feed constraints, and usage of OMS propellant. A Jet Priority Table is used to determine the particular jets to be fired. Each jet in a directional cluster is assigned a priority If RCS RM removes a jet from the Available Jet permission. Status Table, the jet will be removed from the Jet Priority Thus, the Jet Select Module logic will automatically Table. select the next highest priority jet in that directional The crew has the capability to change a jet's cluster. priority on the Jet Priority Table or to override RM deselection of a jet from the Available Jet Status Table.

3.3.2 Displays and Controls

RCS data is sent to the Displays and Controls (D&C) to be displayed on dedicated displays. Switches and circuit breakers in the D&C panels are used for manual valve configuration and power routing to the RCS.

3.3.3 Caution and Warning

A selected portion of the RCS parameters are sent to the Caution and Warning (C&W) unit, where they are limit sensed to determine if RCS anomalies exist. If system anomalies are found, the C&W issues signals that illuminate the proper light on the C&W panel, the master alarm pushbutton indicators (pbis), and turn on the C&W tone.

3.3.4 Orbital Maneuvering System

The ARCS modules are connected with each other and with the OMS by propellant interconnect lines so that either or both OMS module's propellants can be fed to either or both of the ARCS modules.

3.3.5 Electrical Power Distribution and Control System

The Electrical Power Distribution and Control System (EPD&C) provides both AC and DC power to the RCS.

3.3.6 Pulse Code Modulator

Data from the RCS is routed through the Input/Output (I/O) MDMs to the Pulse Code Modulator (PCM) for incorporation in the telemetry downlink to be sent to the ground and to the onboard recorders.

3.3.7 Crew

The crew monitors and controls the RCS performance through CRT displays, fault messages, keyboard item entries, C&W indications, and associated switches and indicators.

3.4 Hierarchy

Figures 3 through 6 illustrate the hierarchy of the RCS hardware components. Figures 7 through 18 depict the functional details of the RCS subsystem components.

4.0 ANALYSIS RESULTS

Detailed analysis results for each of the identified failures are presented in Appendix C. Tables I and II present summaries of the failure criticalities for the three hardware subsystems of the forward and aft RCS, respectively. Tables III and IV present summaries of the failure criticalities for the Electrical Power Distribution and Control (EPD&C) subsystems of the forward and aft RCS, respectively. Further discussion of each of these subsystems and the applicable failure modes is provided in subsequent paragraphs. The RCS analysis hierarchy is illustrated in Figures 3 through 6.

Of the ninety-nine (99) forward RCS hardware failure modes analyzed, sixty-eight (68) were determined to be PCIs. Of the one hundred nine (109) aft RCS hardware failure modes analyzed, seventy-three (73) were determined to be PCIs. Summaries of the forward and aft RCS hardware PCIs are presented in Tables V and VI, respectively. Of the nine hundred ninety-four (994) forward RCS EPD&C failure modes analyzed, two hundred twenty-two (222) were determined to be PCIs. Of the one thousand seventy (1070) aft RCS EPD&C failure modes analyzed, two hundred twenty-seven (227) were determined to be PCIs. Summaries of the forward and aft RCS EPD&C PCIs are presented in tables VII and VIII, respectively.

Appendix D contains a cross reference between each PCI and analysis worksheet in Appendix C.

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
IE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 - - - - 2	 1 5 2 3 - 2		 1 1 - 1 1 -		 - - 3 1 -	1 2 6 2 6 2 4
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PROPELLANT FEEDOUT TUBES PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY JET ALIGNMENT BELLOWS, VERNIER COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 1 2 2 2 2 2 2 - 2 2 - 2 2 - 2 2 - 2 2 - 2	- - 1 - 2 4 - - 12 - -	- - - - - - 1 - - - - - - - - - - -	- - - - - - - - - - - 1			1 1 2 3 2 6 10 2 2 2 2 4 2 2 4 2 2
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	6 1 4 1	1 - -	- - 1 -		2 -		9 1 5 1

.

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3.	TOTAL
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS		 1 5 2 2 - 2	-			- - - 2 2 -	1 2 6 2 4 4 4
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PROPELLANT FEEDOUT TUBES PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES CROSSFEED VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, VERNIER COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	 1 1 1 2 2 2 2 2 - 2 2 - 4	- - - - - - - - - - - - - - - - - - -	 - - - 1 4 - 1 - - - - - - - - - -	- - - 1 - 4 - - - 4 - - - 4 -	- 1 - - -	 - - - - 4 1 - - - 4 1 - - - 4 - - - -	1 1 2 3 2 6 6 10 2 2 20 8 4
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	 6 1 4 1	- - -	- - 1 -	3 - -			9 1 5 1
TOTAL	 37	24	7	 16		24	 109

Criticality:	1/1			3/1R	3/2R	3/3	TOTAI
HE PRESS SUBSYSTEM							
CONTROLS							
VALVES CONTROLLER	l _	3	_	4	_	1	8
DIODE	_	4	_	4	_	4	12
DRIVER	-	3	-	6	-	3	12
FUSE	-	_	-	2	-	-	2
RESISTOR	-	-	-	_	-	16	16
SWITCH, TOGGLE	-	-	-	10	-	5	15
INSTRUMENTATION							
INDICATOR, POSITION	-	-	-	1	-	-	1
SENSOR, PRESSURE	-	-	-	-	-	8	8
SENSOR, TEMPERATURE	-	-	-	-	-	6	6
PROP STOR & DIST SUBSYSTEM							
CONTROLS	1						
VALVES							
CONTROLLER	- 1	_	_	_	3	3	6
DIODE	_	4	-	50	4	114	172
DRIVER	_	4	1	-	3	28	36
FUSE	_	_	-	6	1	3	10
RELAY	-	16	-	4	-	20	40
RESISTOR	-	-	-	-	-	108	108
SWITCH, TOGGLE	-	-	-	10	23	48	81
INSTRUMENTATION							
INDICATOR, POSITION	-	-	-	5	1	-	6
SENSOR, PRESSURE	-	-	-	-	-	24	24
SENSOR, TEMPERATURE	-	-	-	-	-	14	14
THRUSTER SUBSYSTEM CONTROLS							
VALVES							
CONTROLLER	_	-	13	_	4	7	24
DIODE	-	-	4	-	19	15	38
DRIVER	-	-	8	-	3	1	12
FUSE	-	-	6	-	4	3	13
RELAY	_	-	3	-	-	3	6
RESISTOR	-	-	-	-	6	74	80
SWITCH, TOGGLE	-	-	23	-	31	20	74
INSTRUMENTATION		1					
SENSOR, CONTINUITY	-	-	-		-	4	4
SENSOR, PRESSURE	-	-	-	-	10	-	10
SENSOR, TEMPERATURE	-	-	-	-	10	-	10

ABLE III Summary of IOA Fat	llure N	lodes	and Ci	ritica	lities	(FRCS	EPD&C
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTA
HERMAL CONTROL SUBSYSTEM							
FUSE	-	-	5	-	-	-	5
HEATER		-	2	2	4	-	8
RESISTOR	-	-	-	-	-	10	10
SWITCH, THERMAL	-	4	1	1	2	-	8
SWITCH, TOGGLE	-		14	10	5	11	40
POD							
DRIVER	-	-	-	-	24	-	24
FUSE	-	-	-	-	12	-	12
HEATER	-	-	-	-	12	-	12
RELAY	-	-	-	-	4	-	4
RESISTOR	-	-	-	-	4	12	16
SWITCH, TOGGLE	-	-	-	-	3	-	3
THERMOSTAT	-	-	-	-	4	-	4
TOTAL	-	38	80	115	196	565	994

Criticality:	1/1		2/2	3/1R	3/2R	3/3	TOTA
Criticality:		2/ IR					
HE PRESS SUBSYSTEM							1
CONTROLS							
VALVES							
CONTROLLER	-	- 1	-	16	-	-	16
DIODE	-	-	-	8	-	12	20
DRIVER	-	2	-	18	-	4	24
FUSE	-	-	-	4	-	-	4
RESISTOR	-	-	-	-	-	32	32
SWITCH, TOGGLE	-	_	-	10	-	5	15
INSTRUMENTATION							
INDICATOR, POSITION	_	-	_	1	-	-	נ
SENSOR, PRESSURE	-	- 1	1 –	-	_	8	8
SENSOR, TEMPERATURE	_	_	_	_	_	4	
PROP STOR & DIST SUBSYSTEM		1					
CONTROLS							
VALVES							
CONTROLLER	- I	-	-	-	3	3	6
DIODE	-	3	-	3	9	25	4(
DRIVER	- 1	-	4	4	5	39	52
FUSE	- 1	_	-	6	9	2	17
RELAY	-	-	12	15	10	11	48
RESISTOR	-	_	_	-	_	158	158
SWITCH, TOGGLE	-	2	- 1	22	42	43	109
INSTRUMENTATION		-					
INDICATOR, POSITION	_	_	_	3	1	_	
SENSOR, PRESSURE	_	_	_	_	_	8	8
SENSOR, TEMPERATURE	_	_	-	_	_	4	
THRUSTER SUBSYSTEM							
CONTROLS							
VALVES							
CONTROLLER	-	-	2	- 1	24	10	36
DIODE	-	-	2	- 1	50	20	72
DRIVER	-	-	4	-	16	4	24
FUSE	-	-	-	-	19	-	19
RELAY	-	-	-	-	3	3	6
RESISTOR	-	-	-	- 1	9	113	122
SWITCH, TOGGLE	-	-	8	-	48	56	112
INSTRUMENTATION							
SENSOR, CONTINUITY	- 1	- 1	-	-	-	5	5
SENSOR, PRESSURE	- 1	-	-	8	-	12	20
SENSOR, TEMPERATURE	_	_	- 1	3	1	8	12

TABLE IV Summary of IOA Fa	llure N	lodes a	and Cri	lticali	ities (ARCS I	EPD&C)
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
THERMAL CONTROL SUBSYSTEM THRUSTERS							
DRIVER	_	-	1	9	-	-	10
FUSE	-		2	4	-	-	6
HEATER	-	-	2	6	-	-	8
RESISTOR	_		-	-	-	10	10
SWITCH, THERMAL	-	4	1	3	-	-	8
SENSOR, TOGGLE	-	-	10	10	-	10	30
TOTAL		11	48	153	249	609	1070

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
HE PRESS SUBSYSTEM						
STORAGE TANK	1	-	-	-	-	1
TANK ISOLATION VALVES	-	1	-	-	-	1
REGULATOR ASSEMBLIES	-	5	-	-	-	5
OUAD CHECK VALVE ASSEMBLY	-	2	-	-	-	2
COUPLINGS (SINGLE SEAL)	-	3	-	-	-	3
LINES AND FITTINGS	2	2	-			4
PROP STOR & DIST SUBSYSTEM						
PROPELLANT TANKS	1	-	-	-	-	1
PROPELLANT CHANNEL SCREENS	1	-	-	-	-	1
PROPELLANT FEEDOUT TUBES	1	-	-	-	-	1
PRESSURE RELIEF ASSEMBLIES	1	1 1	-	-	-	2
GROUND MANUAL ISOL VALVES	2	-	-	-	-	2
GIMBAL BELLOWS	2	-	-	-	-	2
TANK ISOL VALVES	2	2	-	-	-	4
MANIFOLD ISOL VLVS, PRIMARY	2	4	-	-	-	6
MANIFOLD ISOL VLVS, VERNIER	-	-	1	-	-	1
JET ALIGNMENT BELLOWS, PRIMARY	2	-	-	-	-	2
JET ALIGNMENT BELLOWS, VERNIER	2	-	-	-	-	2
COUPLINGS (SINGLE SEAL)	-	12	-	-	-	12
LINES AND FITTINGS	2	-	-	-		2
THRUSTER SUBSYSTEM						
PRIMARY JETS	1					_
BIPROP SOLENOID VALVES	6	1	-	-	-	7
COMBUSTION CHAMBER OR NOZZLE	2 1	-	-	-	-	1
VERNIER JETS			1			-
BIPROP SOLENOID VALVES	4	-	1	-	-	5
COMBUSTION CHAMBER OR NOZZLI				-		1
TOTAL	33	33	2	_	-	68

Criticality:		2/1R		3/1R	3/2R	TOTA
HE PRESS SUBSYSTEM						
STORAGE TANK	1	-	-	_	-	1
TANK ISOLATION VALVES	-	1	-	-	-	1
REGULATOR ASSEMBLIES	-	5	-	-	-	5
QUAD CHECK VALVE ASSEMBLY	-	2	-	-	-	2
COUPLINGS (SINGLE SEAL)		2	-	-	-	2
LINES AND FITTINGS	2	2	-	-	-	4
PROP STOR & DIST SUBSYSTEM						
PROPELLANT TANKS	1	-	-	-	-	1
PROPELLANT CHANNEL SCREENS	1	-	-	-	-	1
PROPELLANT FEEDOUT TUBES	1	-	-	-	-	1
PRESSURE RELIEF ASSEMBLIES	1	1	-	-	-	2
GROUND MANUAL ISOL VALVES GIMBAL BELLOWS	2	-	-	-	-	2
TANK ISOL VALVES	2 2	-	-		-	2
CROSSFEED VALVES	2	Ŧ	1	-	1	5 6
MANIFOLD ISOL VLVS, PRIMARY	2		4	4	-	6
MANIFOLD ISOL VLVS, VERNIER	-		1		_	1
JET ALIGNMENT BELLOWS, PRIMARY	2	_ [1	_		2
JET ALIGNMENT BELLOWS VERNIER		_	_	_	_	2
COUPLINGS (SINGLE SEAL)	-	10	-	_	_	10
LINES AND FITTINGS	4	-	-	-	-	4
HRUSTER SUBSYSTEM						
PRIMARY JETS						
BIPROP SOLENOID VALVES	6	-	-	-	-	6
COMBUSTION CHAMBER OR NOZZLE	1	-	-	-	-	l
VERNIER JETS						
BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	4	-	1	-	-	5
COMBOSTION CHAMBER OR NOZZLE	1			-	-	1
TOTAL	37	24	7	4	1	73

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAI
HE PRESS SUBSYSTEM CONTROLS VALVES CONTROLLER DIODE DRIVER FUSE SWITCH, TOGGLE		3 4 3 - -	- - - -	- 4 2 1 5	- - - - -	3 8 5 1 5
PROP STOR & DIST SUBSYSTEM CONTROLS VALVES DIODE DRIVER RELAY SWITCH, TOGGLE		4 4 16 -	- 1 -	42 - 4 6	2 - - 12	48 5 20 18
THRUSTER SUBSYSTEM CONTROLS VALVES CONTROLLER DIODE DRIVER FUSE RELAY RESISTOR SWITCH, TOGGLE	- - - - - - - - -	- - - - - - -	13 4 8 6 3 - 23			13 23 8 6 3 6 23
THERMAL CONTROL SUBSYSTEM THRUSTERS FUSE HEATER SWITCH, THERMAL SWITCH, TOGGLE		- - 4 -	5 2 1 14	- - - 1		5 2 5 15
TOTAL	-	38	80	65	39	222

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
HE PRESS SUBSYSTEM						
CONTROLS						
VALVES CONTROLLER				-		
DIODE	-	-	-	6	-	6
DRIVER		2		4	-	8
SWITCH, TOGGLE	-	-	-	5	-	5
PROP STOR & DIST SUBSYSTEM		 	 	 	- -	<u> </u>
CONTROLS						1
VALVES						
CONTROLLER	-	-	-	-	2	2
DIODE	-	3	-	3	9	15
DRIVER	-	-	4	4	2	10
RELAY SWITCH, TOGGLE	-	- 2	12	13 6	8 19	33
THRUSTER SUBSYSTEM CONTROLS VALVES CONTROLLER DIODE		-	2		- 50	2
DRIVER	-	-	4	_		4
FUSE	-	-	_	_	7	7
RESISTOR	-	-	_	-	9	9
SWITCH, TOGGLE	-		8	-	_	8
THERMAL CONTROL SUBSYSTEM THRUSTERS						
DRIVER	-	-	1	9	-	10
FUSE	-	-	2	4	-	6
HEATER	-	-	2	-	-	2
SWITCH, THERMAL	-	4	1	-	-	5
SWITCH, TOGGLE			10		-	10
TOTAL		11	48	62	106	227

4.1 Analysis Results - Helium Pressurization Subsystem

4.1.1 Analysis Results - Forward Helium Pressurization Subsystem

Twenty-three (23) failure modes were analyzed in the forward helium pressurization subsystem and sixteen (16) were identified as PCIs. All sixteen of the PCIs are single point failures which could result in possible damage to surrounding components, inability to repressurize the propellant tanks, system overpressurization, or migration of propellants into helium lines.

These critical failures are caused by helium tank structural failure, helium leakage due to structural failure of components or lines, flow path loss due to failure-to-open of components or system contamination, and check valve failures.

4.1.2 Analysis Results - Aft Helium Pressurization Subsystem

Twenty-three (23) failure modes were analyzed in the aft helium pressurization subsystem and fifteen (15) were identified as PCIs. All fifteen of the PCIs are single point failures which could result in possible damage to surrounding components, inability to repressurize the propellant tanks, system overpressurization, or migration of propellants into helium lines.

These critical failures are caused by helium tank structural failure, helium leakage due to structural failure of components or lines, flow path loss due to failure-to-open of components or system contamination, and check valve failures.

- 4.2 Analysis Results Propellant Storage and Distribution Subsystem
- 4.2.1 Analysis Results Forward Propellant Storage and Distribution Subsystem

Sixty (60) failure modes were analyzed in the forward propellant storage and distribution subsystem, of which thirty-eight (38) were identified as PCIs. All thirty-eight of the PCIs are single point failures which could result in leakage of propellant, loss of propellant flow path, inability to use or deplete propellant, system overpressurization, loss of manifolds, and loss of thrusters.

These critical failures are caused by structural failure of the propellant tank, components, and propellant lines, seal failures, contamination, failure of valves to operate, failure of the pressure relief assembly, and propellant tank screen structural failures.

4.2.2 Analysis Results - Aft Propellant Storage and Distribution Subsystem

Seventy (70) failure modes were analyzed in the aft propellant storage and distribution subsystem, of which forty-five (45) were identified as PCIs. Forty (40) of the forty-five PCIs are single point failures which could result in leakage of propellant, loss of propellant flow path, inability to use or deplete propellant, system overpressurization, loss of manifolds or crossfeed valves, loss of thrusters, and loss of vehicle control. The remaining five (5) PCIs could result in loss of life or vehicle during an RTLS abort due to the inability to complete OMS or RCS propellant dumps leading to possible violations of pod structural constraints or vehicle entry center-of-gravity limits.

These critical failures are caused by structural failure of the propellant tank, components, and propellant lines, seal failures, contamination, failure of valves to operate, failure of the pressure relief assembly, and propellant tank screen structural failures.

4.3 Analysis Results - Thruster Subsystem

4.3.1 Analysis Results - Forward Thruster Subsystem

Sixteen (16) failure modes were analyzed in the forward thruster subsystem, of which fourteen (14) were identified as PCIs. All of the fourteen PCIs are single point failures resulting in excessive propellant usage, leakage of propellant, loss of propellant flow path, engine explosion or burnthrough, loss of thruster on-off control, and inability to deplete propellants leading to Orbiter center-of-gravity limit violations during entry.

These critical failures are caused by loss of vernier jets, structural failure of components and propellant lines, seal failures, contamination, failure to open or close of thruster valves, deselection of opposite-firing thrusters by Redundancy Management, improper propellant mixture ratios, and structural failures of the injector assembly, combustion chamber, and nozzle extension.

4.3.2 Analysis Results - Aft Thruster Subsystem

Sixteen (16) failure modes were analyzed in the aft thruster subsystem, of which thirteen (13) were identified as PCIs. All of the thirteen PCIs are single point failures resulting in excessive propellant usage, leakage of propellant, loss of propellant flow path, engine explosion or burnthrough, loss of thruster on-off control, or loss of vehicle control.

These critical failures are caused by loss of vernier jets, structural failure of components and propellant lines, seal failures, contamination, failure to open or close of thruster valves, deselection of opposite-firing thrusters by Redundancy Management, improper propellant mixture ratios, and structural failures of the injector assembly, combustion chamber, and nozzle extension.

- 4.4 Analysis Results Electrical Power Distribution and Control Subsystem
- 4.4.1 Analysis Results Controls
- 4.4.1.1 Analysis Results Forward Controls

Seven hundred sixty-five (765) failure modes were analyzed in the forward EPD&C controls subsystem, of which one hundred ninetyfive (195) were identified as PCIs. Of the 195 PCIs, ninety-two (92) are single point failures since their failure resulted in critical valves being stuck open or closed. Another sixty-four (64) of the 195 PCIs could result in loss of vehicle/ life if all redundancy were lost. The remaining thirty-nine (39) PCIs could result in loss of mission if all redundancy were lost.

Criticalities assigned to forward EPD&C failure modes were derived from the effect the failure had on the component being controlled, which was one or more valves, in all cases. Therefore, critical EPD&C failure modes caused critical valves to be stuck open or closed resulting in inability to use or deplete propellant, system overpressurization, zots, loss of manifolds, and loss of thrusters.

4.4.1.2 Analysis Results - Aft Controls

Nine hundred thirty-two (932) failure modes were analyzed in the aft EPD&C controls subsystem, of which one hundred ninety-four (194) were identified as PCIs. Of the 194 PCIs, thirty-nine (39) are single point failures since their failure resulted in critical valves being stuck open or closed. Another forty-nine (49) of the 194 PCIs could result in loss of vehicle/life if all redundancy were lost. The remaining one hundred six (106) PCIs could result in loss of mission if all redundancy were lost.

Criticalities assigned to aft EPD&C failure modes were derived from the effect the failure had on the component being controlled, which was one or more valves, in all cases. Therefore, critical EPD&C failure modes caused critical valves to be stuck open or closed resulting in inability to use or deplete propellant, system overpressurization, zots, loss of manifolds, loss of thrusters, and loss of vehicle control.

4.4.2 Analysis Results - Instrumentation

4.4.2.1 Analysis Results - Forward Instrumentation

Eighty-three (83) failure modes have been analyzed in the forward EPD&C instrumentation subsystem, of which zero (0) were PCIs.

4.4.2.2 Analysis Results - Aft Instrumentation

Sixty-six (66) failure modes have been analyzed in the aft EPD&C instrumentation subsystem, of which zero (0) were PCIs.

4.4.3 Analysis Results - Thermal Control

4.4.3.1 Analysis Results - Forward Thermal Control

Seventy-five (75) failure modes were analyzed in the forward pod thermal control subsystem, of which zero (0) were identified as PCIs.

Seventy-one (71) failure modes were analyzed in the forward thruster thermal control subsystem, of which twenty-seven (27) were identified as PCIs. Twenty-six (26) of the 27 PCIs are single point failures resulting in thruster explosion or loss of thruster thermal control and unplanned changes in mission operations. The remaining one (1) PCI could result in loss of life or vehicle after the failure of all redundancy.

4.4.3.2 Analysis Results - Aft Thermal Control

All of the OMS/RCS pod heaters and thermostats were analyzed in the OMS analysis and are presented in the OMS report.

Seventy-two (72) failure modes were analyzed in the aft thruster thermal control subsystem, of which thirty-three (33) were identified as PCIs. Twenty (20) of the 33 PCIs are single point failures resulting in thruster explosion or loss of thruster thermal control and unplanned changes in mission operations. The remaining thirteen (13) PCIs could result in loss of life or vehicle after the loss of redundancy.

5.0 REFERENCES

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

- 1. Reaction Control System Workbook, RCS 2102, March 3, 1980
- Reaction Control System Shuttle Flight Operations Manual, Volume 8D, March 31, 1980
- 3. OMS/RCS Systems Briefs Handbook, October 1, 1984
- 4. STS Operational Flight Rules Rationale, December 16, 1985 and PCN-1, February 14, 1986
- 5. NSTS 22206, Instructions for Preparation of FMEA and CIL, October 10, 1986.
- 6. Reliability Desk Instruction, No. 100-2G, Flight Hardware FMEA & CIL, 1-31-84.
- 7. VS70-942102 Rev. G, 6-7-84, FRCS Integrated System Schematics, 102, RI Level III.
- 8. VS70-942099 Rev. D, EODO1, 8-30-84, FRCS Integrated System Schematics, 099, 103, 104, RI Level III.
- 9. VS70-943099, Rev. B, EOB12, 7-22-85, OMS/RCS Integrated System Schematics, 099, 103, 104, RI Level III.
- 10. VS70-943102, Rev. C, 10-29-80, OMS/RCS Integrated System Schematics, 102, RI Level III.
- 11. MB0160-007, Rev M, 3-11-80, Steel Tubing, Mat'l spec., RI.
- 12. MC276-0017, Rev D, 6-23-84, Helium High Pressure Coupling, Proc. spec., RI.
- 13. MC276-0018, Rev B, 2-14-84, Hypergolic Service Coupling, Proc. spec., RI.
- 14. MC282-0082, Rev D, 3-17-82, Pressurant Storage Tank, Proc. spec., RI.
- 15. MC284-0421, Rev E, 5-3-82, Pressure Relief Valve, Proc. spec., RI.
- 16. MC284-0430, Rev E, 6-22-81, AC Motor Valve, Proc. spec., RI.
- 17. MC284-0480, Rev C, 5-3-82, Manual Operated Valve, Proc. spec., RI.
- 18. MC284-0481, Rev B, 6-23-84, Quad Check Valve, Proc. spec., RI

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- 19. MC363-0031, Rev C, 3-15-78, Electrical Heater, Detail Proc. spec., RI.
- 20. ME276-0032, Rev B, 7-20-79, Test Point Coupling, Spec. Control Dwg., RI.
- 21. AMS5562A, 7-15-80, Steel Tubing, Mat'l spec., SAE.
- 22. 73P550015, Rev B, 3-22-82, Gimbal Bellows, Proc. spec., MDAC.
- 23. 73P550003 Alignment Bellows Drawing, MDAC.
- 24. MC282-0061, Rev. G, RCS Propellant Tank, Proc. Spec., MDAC.
- 25. MC271-0095, RCS Propellant Line Flexible Assembly, Proc. Spec., MDAC.
- 26. MC467-0029, Rev. G, RCS Vernier Thruster Assembly, Proc. Spec., MDAC.
- 27. VS70-420309, Rev. D, 6-4-84, Aft RCS Subsystem Control Left OMS Pod Schematic Diagram.
- 28. JSC-11174, Space Shuttle Systems Handbook, Rev. C, DNC-5, 9-13-85.

APPENDIX A ACRONYMS

AC	-	Alternating Current
ALC	-	Aft Load Controller
ALCA	-	Aft Load Control Assembly
AMCA	-	Aft Motor Control Assembly
AOA		Abort-Once-Around
APC	-	Aft Power Controller
ARCS		Aft Reaction Control System (Subsystem)
ASSY		
ATO	_	Abort-To-Orbit
ATT	_	Attitude
BCE	_	Bus Control ELement
BFS	_	Backup Flight System
BTU	_	Bus Terminal Unit
CEW	_	Caution and Warning
C&W CIL	_	Critical Items List
CL	_	Close (Closed)
CMD	_	Bus Control ELement Backup Flight System Bus Terminal Unit Caution and Warning Critical Items List Close (Closed) Command, Commander
CMD	_	Control
CNTL ONTE D	-	Controller
CNTLR	-	Criticality
CRIT	-	Cathode-Ray Tube
	-	Displays and Controls
D&C	-	Digital Autopilot
DAP		Direct Current
dc		
DOD	-	Department of Defense
DPS		Data Processing System (Subsystem)
DTO		Detailed Test Objective
EI		Entry Interface Electrical Power Distribution and Control
EPDC		
ET		External Tank
F		Fahrenheit
F		Functional
FA	-	Flight Aft
FCOS	-	Flight Control Operating System
FDA		Fault Detection and Annunciation
FF		Flight Forward
	-	Forward Load Control Assembly
FLT	-	Flight
FM		Failure Mode
FMCA	-	Forward Motor Control Assembly
FMEA	-	Failure Modes and Effects Analysis
FRCS	-	Forward Reaction Control System (Subsystem)
FSW		Flight Software
ft		Feet
FU		Fuel
FUNC		Function
FWD		Forward
G	-	Gravity
GFE	-	Government Furnished Equipment
GNC	-	Guidance, Navigation, and Control

GPC	-	General Purpose Computer
GSE	-	
He	_	Helium
HW		Hardware
I/C	-	
I/0		
ID	-	
		Inside Diameter
IMU	-	
IOA	-	
ISOL	-	
ISP	-	
JSC	-	
L	-	Left
LCA	-	Load Controller Assembly
LRU	-	
MAN	_	Manual
MCA	-	
MCC		
MDAC		
MDAC		
	-	
MECO		
MM	-	
MMH	-	
msec		Millisecond
N204	-	Nitrogen Tetroxide
NA	-	
NASA	-	
NSTS		National Space Transportation System
NTO	-	Nitrogen Tetroxide
OA	-	Operational Aft
OF	_	Operational Forward
0I	-	Operational Instrumentation
OMRSD	_	Operational Maintenance Demuinements and
OPHIOD	_	eperational Mathematice Requirements and
ONG		Specifications Document
OMS	-	Orbital Maneuvering System
OP	-	Open
OPS	-	Operations Sequence
OX	-	Oxidizer
OXID	-	Oxidizer
P		Pitch
PAD	-	Propellant Acquisition Device
PASS	-	Primary Avionics Software System
PBI	-	Push-Button Indicator
PC		Chamber Pressure
PCA		Power Control Assembly
PCI	_	Potential Critical Item
PCM		Pulse Code Modulation
PCMMU		
	-	Pulse Code Modulation Master Unit
PLS		Primary Landing Site
PRCS	-	Primary Reaction Control System (jet)
PRESS		Pressure
PROC		Processor
psi	-	Pounds per Square Inch
psia	-	Pounds per Square Inch Absolute

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psid		Pounds per Square Inch Differential
psig	-	Pounds per Square Inch Gage Programmed Test Input
PTI		
PWR		Power
R		Right
R		Roll
RCS	-	Reaction Control System
RHC	-	Rotation Hand Controller
RI	-	Rockwell International
		Reaction Jet Driver
RM	-	Redundancy Management
RPC		
		Return-to-Launch Site
scfm	_	Standard Cubic Feet per Minute
SFOM	_	Shuttle Flight Operations Manual
SOP	-	
SPEC	-	
SSSH		
STS	-	
SUM	-	
SYS	-	
		Transatlantic Abort Landing
THC	_	Translation Hand Controller
TK	_	Tank
TPS	-	Thermal Protection System
VERN		Vernier
VLV	_	Valve
VRCS	_	Vernier Reaction Control System (jet)
Y		Yaw

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APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

- B.1 DefinitionsB.2 Project Level Ground Rules and AssumptionsB.3 Subsystem-Specific Ground Rules and Assumptions

APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.1 Definitions

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

INTACT ABORT DEFINITIONS:

<u>RTLS</u> - begins at transition to OPS 6 and ends at transition to OPS 9, post-flight

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

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

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

<u>CREDIBLE</u> (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

<u>CONTINGENCY</u> <u>CREW</u> <u>PROCEDURES</u> - 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

<u>MAJOR</u> <u>MODE</u> (MM) - major sub-mode of software operational sequence

 $\frac{MC}{(PASS)}$ - Memory Configuration of Primary Avionics Software System

<u>MISSION</u> - 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:

<u>PRELAUNCH PHASE</u> - 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.

 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.

APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.3 RCS Ground Rules and Assumptions

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

- 1. The function of an RCS thruster is to provide thrust in a certain axis and direction. Therefore, from a top down system analysis approach, thrusters which fire in the same axis and direction may be considered redundant to each other. The function of electrical systems is to provide power to the components of the RCS hardware systems. Redundancy, as applied to electrical systems, is considered to be redundant electrical paths, systems, or controls. Therefore, thrusters which fire in the same direction may not be considered redundant to an electrical failure. Thruster hardware and certain electrical components may be grouped by firing axes.
- 2. For the ARCS, entry criticalities are dependent on the number of pitch, yaw, and roll thrusters available (e.g., loss of pitch control results in loss of vehicle). Abort criticalities for both FRCS and ARCS are also dependent upon the number of thrusters available in certain axes. All aft RCS pitch, yaw, and roll thrusters and all forward RCS yaw thrusters are required for the successful completion of OMS/RCS propellant dumps during RTLS aborts. The time available to complete propellant dumps is less during RTLS than during other intact abort modes.
- 3. Only PASS software is considered in this analysis. BFS is not considered for flight or abort analyses. RCS Redundancy Management (RM), certain software sequences, and Software Operating Procedures (SOPs) are considered in the analysis.
- 4. Inability to accomplish DTOs or PTIs during entry due to an RCS failure can lead to loss of mission during the deorbit phase.
- 5. Internal leakage of a valve is fluid which leaks through the valve into the line. External leakage of a valve is fluid which leaks through the valve housing.

- 6. Coupling caps are considered redundancy for quick disconnect couplings. Leaks through poppet seals and coupling caps are assumed to be leaking overboard, not internally. Where it cannot be determined how many seals exist in a coupling, it will be assumed that only a poppet seal and a cap seal exist.
- 7. The pressure relief valve is considered to be an emergency system because it incorporates a burst disk.
- 8. If applicable, the redundancy and criticalities assigned to an electrical component may be tied to those assigned to hardware components affected by the failure of the electrical component.
- 9. Software capabilities which allow control over the operation of hardware components are considered to be redundant to electrical components which control the operation.
- 10. For the thermal control analysis it is assumed that, at the time of vehicle liftoff, all areas of the thermal environment are within redlines.
- 11. Instrumentation passage of screen B does not require the ability to discern between sensor or hardware failure, but on detection of the measurement being out of a predefined limit. The ability to differentiate between sensor and hardware failure will be reflected in the criticality assignment.
- 12. It is assumed that propellants leaking through RCS thrusters will not freeze during aborts due to the short duration of these phases.
- 13. It is assumed that after the failure of an RCS thruster, the RCS redundancy management will automatically deselect the opposite-firing thruster.
- 14. The Shuttle Launch Commit Criteria and Background (JSC 16007) and the Operational Maintenance Requirements and Specifications Document (OMRSD) will not be used to determine the passage of redundancy screens. The criteria for determining screen passage outlined in NSTS 22206 will be used as the basis for the passage or failure of the redundancy screens.

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APPENDIX C DETAILED ANALYSIS

This section contains the IOA analysis worksheets generated during the analysis of this subsystem. The information on these worksheets is intentionally similar to the NASA FMEAS. Each of these sheets identifies the hardware item being analyzed and parent assembly. 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 <u>NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986.</u> Finally, effects are entered at the bottom of each sheet, and the worst case criticality is entered at the top.

LEGEND FOR IOA ANALYSIS WORKSHEETS

Hardware Criticalities:

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

Functional Criticalities:

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

Redundancy Screen A:

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

Redundancy Screens B and C:

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

LEGEND FOR IOA RCS MDAC ID

100- 198 - Forward RCS Hardware 199- 307 - Aft RCS Hardware 308-1301 - Forward RCS EPD&C 1302-2371 - Aft RCS EPD&C

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 100	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: HELIUM STORAGE TANK FAILURE MODE: STRUCTURAL FAILURE (RUPTURE OR LEAK)
LEAD ANALYST: SUBSYS LEAD: I).J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HELIUM STORAGE TANK 5) 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/2 DEORBIT: 1/1 LANDING/SAFING: 3/3	RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: FRCS POD PART NUMBER: FU & OX:	

CAUSES: MECHANICAL SHOCK, HIGH PRESSURE, VIBRATION

EFFECTS/RATIONALE:

LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 C, D.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 101	HIGHEST	CRITICALITY HDW/FUN FLIGHT: 2/1R ABORT: 2/1R	C
ITEM: HELIUM FILI FAILURE MODE: FAILS TO CI	COUPLING OSE (FAILS OPEN),	OR LEAKS	
LEAD ANALYST: SUBSY	S LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HELIUM FILL COUPLING 5) 6) 7) 8) 9)			
	CRITICALITIES		
LIFTOFF: 3/	73 R1 73 TA 72R AC 71R AT	HDW/FUNC PLS: 2/1R LL: 2/1R PA: 2/1R PO: 2/1R	
REDUNDANCY SCREENS: A [2] B [NA]	C [P]	
LOCATION: HELIUM/FUEL/ PART NUMBER: FU & OX:	OXIDIZER SERVICIN	IG PANEL	
CAUSES: CONTAMINATION, VI	BRATION, PIECE-PA	ART STRUCTURAL FAILURE	:

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 102			FICALITY HDW/FUNC LIGHT: 3/3 BORT: 3/3
ITEM: HELIUM FAILURE MODE: FAILS (CLOSED)	
LEAD ANALYST:	SUBSYS LEAD: D	J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) HE PRESS SUBSYSTE 4) HELIUM FILL COUPI 5) 6) 7) 8) 9)	M		
	CRITICAL	ITIES	
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	TAL: AOA:	3/3
DEORBIT:	3/3 3/3 3/3 3/3	ATO:	3/3
LANDING/SAFING:	3/3		
REDUNDANCY SCREENS:	A[]]	B[]	c []
LOCATION: HELIUM/F PART NUMBER: FU & OX:		SERVICING PAN	IEL
CAUSES: CONTAMINATION	N, VIBRATION,	PIECE-PART ST	RUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT)

C-4

DATE: 2/26/8 SUBSYSTEM: FRCS MDAC ID: 103	7	HIGHEST CF	RITICALITY FLIGHT: ABORT:	3/1R
ITEM: HE IS FAILURE MODE: FAILS	OL A & B VLVS TO CLOSE (FAII	LS OPEN) OR	LEAKS INTE	RNALLY
LEAD ANALYST:	SUBSYS LEAD: 1	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPON 2) ASSEMBLIES 3) HE PRESS SUBSYS 4) HE ISOL A & B VI 5) 6) 7) 8) 9)	FEM			
	CRITICAI	TTTES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	HDW/FUNC	ABORT	HDW/FUN	С
DET.AINCH.	3/1R	RTLS	3/1R	
T TEROFE.	3/18	TAL:	3/1R	
	2/1P	202:	3/18	
UNURBIT:		አምር •	3/18	
DEORBIT:	3/1R	AIO.	J/ 11	
LANDING/SAFIN	G: 3/3			
REDUNDANCY SCREENS:	A [2]	B [P]	C[P]	
LOCATION: FRCS P PART NUMBER: FU & C				
CAUSES: CONTAMINATI	ON, VIBRATION, MDM	PIECE-PART	STRUCTURAI	FAILURE,
EFFECTS/RATIONALE: REDUNDANCY PROVIDED REDUNDANCY WILL CAUS AND/OR LINES, AND MA	E OVERPRESSURI	GULATORS.	FAILURE OF RUPTURE OF	ALL TANKS
REFERENCES: JSC 111 VS70-942099 REV D EC	74, SPACE SHUT DO1 (42BN & 4)	TLE SYSTEMS 2BT)	HANDBOOK,	11.6;

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 104	Н		TICALITY LIGHT: BORT:	HDW/FUNC 2/1R 2/1R
ITEM: HE ISC FAILURE MODE: FAILS	DL A & B VLVS TO OPEN (FAILS C	LOSED)		
LEAD ANALYST:	SUBSYS LEAD: D.J	. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE: 2) ASSEMBLIES 3) HE PRESS SUBSYST: 4) HE ISOL A & B VLV 5) 6) 7) 8) 9)	EM			
	CRITICALIT	TES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 3/2R 2/1R		2/1R 2/1R	
REDUNDANCY SCREENS:	A [2] B ([NA]	С[Р]	
LOCATION: FRCS POI				

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

STANDBY REDUNDANCY. NEXT ASSOCIATED FAILURE (OTHER VALVE A OR B) WILL CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 C, D.

REPORT DATE 03/18/87

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 105	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: HE LINE, ALL EXCEPT FAILURE MODE: STRUCTURAL FAILURE (ISOL VLV TO PRESS REGULATOR RUPTURE OR LEAK)
LEAD ANALYST: SUBSYS LEAD: I	J.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE LINE, ALL EXCEPT ISOL VLV T 5) 6) 7) 8) 9)	O PRESS REGULATOR
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:2/2DEORBIT:1/1LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:1/1TAL:1/1AOA:1/1ATO:1/1
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: BETWEEN HELIUM TANK AND PART NUMBER: FU & OX:	ND QUAD CHECK VALVES
CAUSES: VIBRATION, MECHANICAL SHOC	K, HIGH PRESSURE

EFFECTS/RATIONALE:

FAILURE WILL CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY, WILL AFFECT ONORBIT OPERATIONS, AND WILL CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 106	HIGHEST CRITICALITY HDW/FUN FLIGHT: 1/1 ABORT: 1/1	4C
ITEM: HE LINE, ALL EXCEPT FAILURE MODE: RESTRICTED FLOW	ISOL VLV TO PRESS REGULATOR	
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE LINE, ALL EXCEPT ISOL VLV T 5) 6) 7) 8) 9)	TO PRESS REGULATOR	
CRITICAI	LITIES	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 1/1	
PRELAUNCH: 3/3 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1	RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1	
ONORBIT: 1/1	AOA: 1/1	
DEORBIT: 1/1 LANDING/SAFING: 3/3	ATO: 1/1	
LANDING/SAFING: 5/5		
REDUNDANCY SCREENS: A []	B[] C[]	
LOCATION: BETWEEN HELIUM TANK A PART NUMBER: FU & OX:	ND QUAD CHECK VALVES	
CAUSES: CONTAMINATION, PIECE-PART	STRUCTURAL FAILURE	
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROP RESULTING IN ZOTS AND/OR THRUSTER N VEHICLE.		ק

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN).

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 107		HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: HE LINE, FAILURE MODE: STRUCTU	RAL FAILURE (R	UPTURE OR	ULATOR LEAK)	
LEAD ANALYST: S	UBSYS LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE LINE, ISOL VLV 5) 6) 7) 8) 9)	М	LATOR		
	CRITICALI	TIES		
LIFTOFF:	HDW/FUNC 3/3 3/3 3/2R 2/1R	ABORT RTLS TAL:	2/1R 2/1R 2/1R	c
REDUNDANCY SCREENS:	A [2]	B [P]	C [P]	22

BETWEEN HELIUM ISOLATION VALVES AND PRESSURE LOCATION: REGULATOR PART NUMBER: FU & OX:

CAUSES: VIBRATION, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY CLOSING HELIUM ISOLATION VALVE, AND USING THE PARALLEL HELIUM SUPPLY PATH. FAILURE CAUSES LOSS OF HELIUM PRESSURIZATION. NEXT ASSOCIATED FAILURE WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 108	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: HE LINE, ISOL VLV FAILURE MODE: RESTRICTED FLOW	TO PRESS REGULATOR
LEAD ANALYST: SUBSYS LEAD	: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE LINE, ISOL VLV TO PRESS 5) 6) 7) 8) 9)	REGULATOR
	CALITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:2/1RONORBIT:2/1RDEORBIT:2/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO: 2/1R

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

LOCATION: BETWEEN HELIUM ISOLATION VALVES AND PRESSURE REGULATOR PART NUMBER: FU & OX:

CAUSES: VIBRATION, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY PARALLEL HELIUM PATH. FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 109	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: HIGH PRE FAILURE MODE: FAILS TO	ESSURE HELIUM TEST PORT COUPLINGS A & B D CLOSE (FAILS OPEN), OR LEAKS
LEAD ANALYST: SU	JBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HIGH PRESSURE HELI 5) 6) 7) 8) 9)	
	CRITICALITIES
PRELAUNCH: LIFTOFF: ONORBIT:	IDW/FUNCABORTHDW/FUNC3/3RTLS:3/1R3/3TAL:3/1R3/2RAOA:3/1R3/1RATO:3/1R
REDUNDANCY SCREENS: A	A[2] B[NA] C[P]

LOCATION: FUEL/OXIDIZER PRESSURE SYSTEM INTERNAL PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. FAILURE OF ALL REDUNDANCY WILL CAUSE LOSS OF HELIUM PRESSURIZATION. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:110ABORT:3/3
ITEM: HIGH PRESSURE HELIUM TEST PORT COUPLINGS A & B FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HIGH PRESSURE HELIUM TEST PORT COUPLINGS A & B 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: FUEL/OXIDIZER PRESSURE SYSTEM INTERNAL PANEL PART NUMBER: FU & OX:
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 111	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: HE PRESS FAILURE MODE: FAILS OF PRESSURE	REGULATOR ASSEMBLY EN OR REGULATES AT HI	GHER THAN NORMAL
LEAD ANALYST: SU	BSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE PRESS REGULATOR 5) 6) 7) 8) 9)		
	CRITICALITIES	
LIFTOFF: ONORBIT:	DW/FUNC ABORT 3/1R RTI 3/1R TAI 3/1R AOA 3/1R ATC	HDW/FUNC LS: 3/1R L: 3/1R A: 3/1R D: 3/1R
REDUNDANCY SCREENS: A	[2] B[NA]	С[Р]
TOCATTON: FRCS POD		

LOCATION: FRCS POD PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE HELIUM ISOLATION VALVE AND THE SERIES PRESSURE REGULATOR. FAILURE OF ALL REDUNDANCY WILL CAUSE OVERPRESSURIZATION AND RUPTURE OF THE TANK AND LINES, AND MAY CAUSE ZOTS.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 112	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: HE PRESS REGULATOR A FAILURE MODE: FAILS CLOSED	SSEMBLY
LEAD ANALYST: SUBSYS LEAD: I	D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE PRESS REGULATOR ASSEMBLY 5) 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $2/1R$
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R	RTLS: 2/1R TAL: 2/1R AOA: 2/1R
DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2] I	B [NA] C [P]
LOCATION: FRCS POD PART NUMBER: FU & OX:	
CAUSES: CONTAMINATION, VIBRATION, 1	PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

STANDBY REDUNDANCY. NEXT ASSOCIATED FAILURE (PARALLEL REGULATOR OR PARALLEL HE ISOLATION VALVE) WILL CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 113			CRITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: HE PRESS FAILURE MODE: RESTRICTE	REGULATOR AS	SEMBLY		
LEAD ANALYST: SUP	BSYS LEAD: D	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE PRESS REGULATOR 5) 6) 7) 8) 9)				
	CRITICAL	ITIES		-
FLIGHT PHASE HI	DW/FUNC	ABORT	HDW/FUN	IC
PRELAUNCH:	3/3 2/1R 2/1R 2/1R 2/1R			
LIFTOFF:	2/1R		2/1R	
ONORBIT:	2/1R	AOA		
DEORBIT:	2/1R	ATC	$\sim 2/1$	
LANDING/SAFING:	3/3			
REDUNDANCY SCREENS: A	[2]	B [NA]	С[Р]	
LOCATION: FRCS POD PART NUMBER: FU & OX:				
CAUSES: CONTAMINATION,	BLOCKAGE OF	INLET FI	LTER	
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THROUGH REGULATORS MAY RATIOS, WHICH MAY RESUL	CAUSE UNACCE	ULATOR. PTABLE PF	RESTRICTED H OPELLANT MIX	FLOW (TURE

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 114	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: HE PRESS REGULATOR AS FAILURE MODE: LEAKS EXTERNALLY	SEMBLY
LEAD ANALYST: SUBSYS LEAD: D.	J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE PRESS REGULATOR ASSEMBLY 5) 6) 7) 8) 9)	
CRITICALI	TTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [2] B	[NA] C[P]

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY HELIUM ISOLATION VALVE AND PARALLEL REGULATOR. CREW ACTION TO CLOSE ISOLATION VALVE TO LEAKING REGULATOR AND OPEN REDUNDANT PATH WILL PREVENT TOTAL HELIUM LOSS. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG TO EXCEED SAFETY BOUNDARIES DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT. THERE ARE NO VALVES OR CAPS IN THE SENSING PORT LINES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 115		TICALITY LIGHT: BORT:	HDW/FUNC 2/1R 2/1R
ITEM: HE PRESS REGULATOR HE FAILURE MODE: LEAKS EXTERNALLY	PRIMARY SENSI	1g port	
LEAD ANALYST: SUBSYS LEAD: I).J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE PRESS REGULATOR PRIMARY SEN 5) 6) 7) 8) 9)	ISING PORT		
CRITICA	LITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORT RTLS: TAL: AOA:	2/18	iC
REDUNDANCY SCREENS: A [2]	B [P]	С[Р]	
LOCATION: FUEL/OXIDIZER MANIFO PANEL	LD DRAIN, PUR	GE AND CH	IECKOUT

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY PARALLEL HELIUM PATH AND MANUAL OPERATION OF THE HELIUM ISOLATION VALVE. NEXT ASSOCIATED FAILURE WILL RESULT IN LOSS OF HELIUM PRESSURIZATION CAUSING THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ENTRY OR ABORTS TO MEET THE CG SAFETY BOUNDARIES DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

DATE: SUBSYSTEM: MDAC ID:	2/26/87 FRCS 116	HIGHEST CRITIC FLIC ABON	GHT: 2/1R	
TTEM:	HE PRESS	REGULATOR DRIMARY SENSING	שפטפ	

HE PRESS REGULATOR PRIMARY SENSING PORT FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

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

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

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

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY PARALLEL REGULATOR. FAILURE WILL CAUSE REGULATOR TO REGULATE AT A HIGHER PRESSURE WHICH MAY CAUSE AN UNACCEPTABLE MIXTURE RATIO, RESULTING IN ZOTS. ZOTS MAY CAUSE THRUSTER VALVE DAMAGE LEADING TO PROPELLANT IGNITION WITHIN THE POD AND/OR NOZZLE BURNTHROUGH.

DATE: 2/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 2/1R MDAC ID: 117 ABORT: 2/1R	,
ITEM: HE PRESS REGULATOR OUTLET TEST PORT COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE PRESS REGULATOR OUTLET TEST PORT COUPLING 5) 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:2/1RLIFTOFF:3/3TAL:2/1RONORBIT:3/2RAOA:2/1RDEORBIT:2/1RATO:2/1RLANDING/SAFING:3/33/33/3	
REDUNDANCY SCREENS: A [2] B [NA] C [P]	
LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:	

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR CAP) WILL BE UNDETECTABLE. NEXT ASSOCIATED FAILURE WILL CAUSE LOSS OF HELIUM PRESSURIZATION. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 B, H, I, 6-50, 6-95.

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DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:118ABORT:3/3				
ITEM: HE PRESS REGULATOR OUTLET TEST PORT COUPLING FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)				
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE PRESS REGULATOR OUTLET TEST PORT COUPLING 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: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL				

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 119	F	TICALITY HDW/FUNC LIGHT: 2/1R BORT: 2/1R
ITEM: QUAD CHECK VALVE ASS FAILURE MODE: FAILS TO CLOSE (FAI FLOW)	SEMBLY LS OPEN) OR L	EAKS (REVERSE
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) QUAD CHECK VALVE ASSEMBLY 5) 6) 7) 8) 9)		
CRITICA	LITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:2/1RLANDING/SAFING:3/1R	ABORT RTLS: TAL: AOA: ATO:	2/1R 2/1R 2/1R
REDUNDANCY SCREENS: A [2]	B [F]	С[Р]

LOCATION: FRCS POD PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

NEXT ASSOCIATED FAILURE (VALVE IN SERIES WITH FAILED VALVE FAILS OPEN) WILL ALLOW PROPELLANT TO BACKFLOW INTO THE HELIUM PRESSURIZATION SYSTEM. THIS CAN CAUSE LOSS OF LIFE DURING GROUND SERVICING DUE TO INHALATION OF PROPELLANT VAPORS. CORROSION OF HELIUM REGULATORS AND/OR HELIUM ISOLATION VALVES BY PROPELLANT WHICH HAS BACKFLOWED MAY CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 120	7	HIGHEST CF	RITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: QUAD C FAILURE MODE: FAILS	CHECK VALVE AS TO OPEN (FAII			
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) HE PRESS SUBSYST 4) QUAD CHECK VALVE 5) 6) 7) 8) 9)	EM			
	CRITICA	LITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:		
LIFTOFF:	3/3	TAL:		
ONORBIT:	3/2R	AOA:		
DEORBIT:	2/1R	ATO:	2/1R	
LANDING/SAFING	3/3			
REDUNDANCY SCREENS:	A [2]	B[F]	С[Р]	

LOCATION: FRCS POD PART NUMBER: FU & OX:

CAUSES: PIECE-PART STRUCTURAL FAILURE, LOW TEMPERATURE FREEZES PROPELLANT INSIDE VALVE

EFFECTS/RATIONALE:

NEXT ASSOCIATED FAILURE (PARALLEL VALVE FAILS CLOSED) WILL CAUSE LOSS OF HELIUM PRESSURIZATION. LOSS OF HELIUM PRESSURIZATION CAPABILITY WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 C, D.

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DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:2/1RMDAC ID:121ABORT:2/1R	2
ITEM: QUAD CHECK VALVE TEST PORT COUPLINGS A & B FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) QUAD CHECK VALVE TEST PORT COUPLINGS A & B 5) 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:2/1RLIFTOFF:3/3TAL:2/1RONORBIT:3/2RAOA:2/1RDEORBIT:2/1RATO:2/1RLANDING/SAFING:3/3X	
REDUNDANCY SCREENS: A [2] B [NA] C [P]	

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL CAUSE LOSS OF HELIUM UNTIL CREW CLOSES HELIUM ISOLATION VALVES. FAILURE OF ALL REDUNDANCY WILL CAUSE LOSS OF HELIUM PRESSURIZATION, WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 122			FICALITYHDW/FUNCLIGHT:3/3BORT:3/3
ITEM: QUAD CH FAILURE MODE: FAILS S			INGS A & B
LEAD ANALYST:	SUBSYS LEAD: D	J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) HE PRESS SUBSYSTE 4) QUAD CHECK VALVE 5) 6) 7) 8) 9)	M	PLINGS A & B	
	CRITICAL	ITIES	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3 3/3 3/3 3/3	ABORT RTLS: TAL: AOA: ATO:	3/3
REDUNDANCY SCREENS:	A []	в[]	c []
LOCATION: FUEL/OXI PANEL PART NUMBER: FU & OX:	DIZER MANIFOL	D DRAIN, PURG	SE AND CHECKOUT
CAUSES: CONTAMINATION	, VIBRATION,	PIECE-PART ST	TRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

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DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 123	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1	
ITEM: PROPELLANT TANK FAILURE MODE: STRUCTURAL FAILURE	(RUPTURE OR LEAK)	
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROPELLANT TANK 5) 6) 7) 8) 9)		
CRITICA	LITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:1/1LIFTOFF:1/1ONORBIT:1/1DEORBIT:1/1LANDING/SAFING:1/1		
REDUNDANCY SCREENS: A []	B[] C[]	
LOCATION: FRCS POD PART NUMBER: FU & OX:		
CAUSES: MECHANICAL SHOCK, HIGH PR	ESSURE, VIBRATION	
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LEAKING INTO THE POD/VEHICLE. LOSS OF PROPELLANT INTO THE POD CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.		

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:1/1MDAC ID:124ABORT:1/1	2
ITEM: PROP LINES, ALL FAILURE MODE: STRUCTURAL FAILURE (RUPTURE OR LEAK)	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP LINES, ALL 5) 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:1/11/1	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION. ANY LINE BETWEEN PROPELLANT TANK AND THRUSTERS.	

LOCATION: ANY LINE BETWEEN PROPELLANT TANK AND THRUSTERS. PART NUMBER: FU & OX:

CAUSES: VIBRATION, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:

PRESSURE IN TANK AND LINE WILL FORCE PROPELLANT OUT OF LINE INTO POD/VEHICLE. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 125 ITEM: PROP LINES, ALL FAILURE MODE: RESTRICTED FLOW	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1		
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP LINES, ALL 5) 6) 7) 8) 9)			
CRITIC	ALITIES		
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:1/1ONORBIT:1/1DEORBIT:1/1LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1		
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: ANY LINE BETWEEN PROPELLANT TANK AND THRUSTERS. PART NUMBER: FU & OX:			
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE			

EFFECTS/RATIONALE:

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

DATE: 2/26/8 SUBSYSTEM: FRCS MDAC ID: 126	7 HIGHES	T CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R	
ITEM: PROP FILL VENT REGULATOR CHECKOUT COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS EXTERNALLY			
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP FILL VENT REGULATOR CHECKOUT COUPLING 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC ABORT 2/1R RT 2/1R TA 2/1R AC 2/1R AC 2/1R AT	HDW/FUNC PLS: 2/1R AL: 2/1R DA: 2/1R CO: 2/1R	
REDUNDANCY SCREENS:	A [2] B [NA]	C [P]	

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

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DATE: 2/26/87 HIG SUBSYSTEM: FRCS MDAC ID: 127	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: PROP FILL VENT REGULATOR CHECKOUT COUPLING FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)			
LEAD ANALYST: SUBSYS LEAD: D.J.	PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP FILL VENT REGULATOR CHECKOUT COUPLING 5) 6) 7) 8) 9)			
CRITICALITIE	S		
FLIGHT PHASE HDW/FUNC A PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3		
DEORBIT: 3/3 LANDING/SAFING: 3/3	A10. 373		
REDUNDANCY SCREENS: A [] B [] C[]		
LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:			
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE			

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

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DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:1/1MDAC ID:128ABORT:1/1			
ITEM: PROP CHANNEL SCREENS FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)			
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP CHANNEL SCREENS 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:3/33/31/1			
REDUNDANCY SCREENS: A [] B [] C []			
LOCATION: PROPELLANT TANK INTERIOR PART NUMBER: FU & OX:			
CAUSES: HIGH PRESSURE, VIBRATION, PIECE-PART STRUCTURAL FAILURE			
EFFECTS / RATTONALE.			

EFFECTS/RATIONALE:

HELIUM INGESTION WILL CAUSE ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH. FAILURE IS NOT DETECTABLE UNTIL THRUSTERS FAIL DUE TO HELIUM INGESTION OR ZOTS.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 129	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1		
ITEM: PROP FEEDOUT TUBE FAILURE MODE: RESTRICTED FLOW			
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP FEEDOUT TUBE 5) 6) 7) 8) 9)			
CRITICAL	LITIES		
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:1/1ONORBIT:1/1DEORBIT:1/1LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1		
REDUNDANCY SCREENS: A []	в[] С[]		
LOCATION: PROPELLANT TANK INTER PART NUMBER: FU & OX:	RIOR		
CAUSES: CONTAMINATION, VACUUM, PIR	ECE-PART STRUCTURAL FAILURE		
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.			
REFERENCES: JSC 11174, SPACE SHUT VS70-942099 REV D EO DO1 (42BN & 42 APPLIES; RCS 2102, FIG. 3.1.	TLE SYSTEMS HANDBOOK, 11.6; 2BT); FLIGHT RULE 6-41 F		

DATE:2/26/87HIGHEST CRITICALITSUBSYSTEM:FRCSFLIGHT:MDAC ID:130ABORT:	2/1R		
ITEM: PROP TK UPPER COMPARTMENT CHANNEL CHECK COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS E			
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK UPPER COMPARTMENT CHANNEL CHECKOUT COUPLINES 5) 6) 7) 8) 9)	NG		
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUPRELAUNCH:2/1RRTLS:2/11LIFTOFF:2/1RTAL:2/11ONORBIT:2/1RAOA:2/11DEORBIT:2/1RATO:2/11LANDING/SAFING:2/1RATO:2/11	R R R		
REDUNDANCY SCREENS: A [2] B [NA] C [P]]		
LOCATION: FRCS FRONT TRUNNION			

LOCATION: FRCS FRONT TRUNNION PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 131	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
	UPPER COMPARTMENT CHANNEL CHECKOUT
COUPLING FAILURE MODE: FAILS	FO OPEN (FAILS CLOSED)
LEAD ANALYST:	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK UPPER COM 5) 6) 7) 8) 9)	
	CRITICALITIES
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 3/3 AOA: 3/3 3/3 ATO: 3/3
REDUNDANCY SCREENS:	

LOCATION: FRCS FRONT TRUNNION PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE: 2/26/8 SUBSYSTEM: FRCS MDAC ID: 132	7	HIGHEST CF	RITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
	TK LOWER COMPA TO CLOSE (FAI			
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK LOWER CO 5) 6) 7) 8) 9)	SUBSYSTEM	NNEL BLEED C	OUPLING	
	CRITICAL	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC 2/1R 2/1R 2/1R 2/1R 2/1R			2
REDUNDANCY SCREENS:	A [2]	B [NA]	С[Р]	

LOCATION: HELIUM/FUEL/OXIDIZER SERVICING PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:133ABORT:3/3			
ITEM: PROP TK LOWER COMPARTMENT CHANNEL BLEED COUPLING FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)			
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK LOWER COMPARTMENT CHANNEL BLEED COUPLING 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A			
REDUNDANCY SCREENS: A [] B [] C []			
LOCATION: HELIUM/FUEL/OXIDIZER SERVICING PANEL PART NUMBER: FU & OX:			
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE			

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

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DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 134			ITICALITY FLIGHT: ABORT:	2/1R
ITEM: PROP TK FAILURE MODE: FAILS T				
LEAD ANALYST: S	UBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK LOWER COM 5) 6) 7) 8) 9)	SUBSYSTEM	KHEAD BLEED (COUPLING	
	CRITICAI	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	HDW/FUNC	ABORT	HDW/FUNC	2
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]	С[Р]	
LOCATION: HELIUM/FUEL/OXIDIZER SERVICING PANEL PART NUMBER: FU & OX:				
CAUSES: CONTAMINATION	, VIBRATION,	PIECE-PART	STRUCTURAL	FAILURE

EFFECTS/RATIONALE:

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FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 135	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: PROP T FAILURE MODE: FAILS	K LOWER COMPARTMENT BULKHEAD BLEED COUPLING TO OPEN (FAILS CLOSED)
LEAD ANALYST:	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK LOWER CO 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 RTLS: 3/3 3/3 TAL: 3/3 3/3 AOA: 3/3 3/3 ATO: 3/3
LANDING/SAFING	: 3/3
REDUNDANCY SCREENS:	A[] B[] C[]
LOCATION: HELIUM/ PART NUMBER: FU & OX	FUEL/OXIDIZER SERVICING PANEL
CAUSES: CONTAMINATIC	N, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

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DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 136	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
	K VENT AND REGULATOR CH TO CLOSE (FAILS OPEN),	
LEAD ANALYST:	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK VENT AND 5) 6) 7) 8) 9)		PLING
	CRITICALITIES	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC ABORT 2/1R RTL 2/1R TAL 2/1R AOA 2/1R ATO	S: 2/1R : 2/1R : 2/1R : 2/1R
REDUNDANCY SCREENS:	A [2] B [NA]	С[Р]

LOCATION: HELIUM/FUEL/OXIDIZER SERVICING PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

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FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 137	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: PROP TK VENT AND REG FAILURE MODE: FAILS TO OPEN (FAIL	GULATOR CHECKOUT COUPLING S CLOSED)		
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK VENT AND REGULATOR CHECKOUT COUPLING 5) 6) 7) 8) 9)			
CRITICA	LITIES		
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 3/3		
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: 3/3		
ONORBIT: 3/3	AOA: 3/3 ATO: 3/3		
DEORBIT: 3/3 LANDING/SAFING: 3/3	A10. 373		
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: HELIUM/FUEL/OXIDIZER SERVICING PANEL PART NUMBER: FU & OX:			
CAUSES: CONTAMINATION, VIBRATION,	PIECE-PART STRUCTURAL FAILURE		

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

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DATE: 2/26/87 I SUBSYSTEM: FRCS MDAC ID: 138	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: GIMBAL BELLOWS FAILURE MODE: STRUCTURAL FAILURE (R	UPTURE OR LEAK)
LEAD ANALYST: SUBSYS LEAD: D.	J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GIMBAL BELLOWS 5) 6) 7) 8) 9)	
CRITICALI	PTES
	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1
REDUNDANCY SCREENS: A [] B	[] c[]

LOCATION: DOWNSTREAM OF PROPELLANT TANK PART NUMBER: FU & OX: 73P550015-1006

CAUSES: HIGH PRESSURE, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

ASSUME THIS IS A SINGLE BARRIER FAILURE, THAT IS, NO INTERNAL LEAK PATH REDUNDANCY EXISTS. FAILURE RESULTS IN PROPELLANT LEAKING INTO THE POD/VEHICLE. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 139	HIGHEST	CRITICALITY FLIGHT: ABORT:	1/1
ITEM: GIMBAL BELLOWS FAILURE MODE: RESTRICTED FLOW			
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GIMBAL BELLOWS 5) 6) 7) 8) 9)			
CRITICA	LITTES		
FLIGHT PHASE HDW/FUNC	ABORT	HDW/FUN	C
PRELAUNCH: 3/3	RT	LS: $1/1$ L: $1/1$	
LIFTOFF: 1/1	TAI	i: 1/1	
ONORBIT: 1/1		A: $1/1$	
LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1	ATC	b: 1/1	
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A []	в[]	с[]	
LOCATION: DOWNSTREAM OF PROPELLANT TANK PART NUMBER: FU & OX: 73P550015-1006			
CAUSES: CONTAMINATION, VACUUM, PIECE-PART STRUCTURAL FAILURE			
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PRO	PELLANT M	IXTURE RATIO,	, LOSS OF

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 F.

C-41

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DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 140	HIGHES	T CRITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: PRESSURE FAILURE MODE: BURST DIS		PRESSURE, OR L	EAKS
LEAD ANALYST: SUB	SYS LEAD: D.J. PAU	L	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PRESSURE RELIEF ASSEMBLY 5) 6) 7) 8) 9)			
	CRITICALITIES		
FLIGHT PHASE HD PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING (SAFING)	W/FUNC ABOR	r HDW/FUNG	2
PRELAUNCH:	2/1R R'	TLS: $2/1R$	
LIFTOFF:	2/1R T	AL: 2/1R	
ONORBIT:	2/1R A	DA: 2/1R	
DEORBIT:	2/1R A'	TO: 2/1R	
LANDING/SAFING:	2/1R	_,	
REDUNDANCY SCREENS: A	[2] B[NA]	С[Р]	
LOCATION: FRCS POD PART NUMBER: FU & OX:			
CAUSES: MATERIAL FLAW,	VIBRATION, PIECE-P.	ART STRUCTURAL	FAILURE
FFFFCTS /DATIONALE.			

EFFECTS/RATIONALE:

FIRST FAILURE (BURST DISK RUPTURE) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE (PRESSURE RELIEF VALVE) WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS		FLIGHT:	1/1
MDAC ID:	141		ABORT:	1/1
MDAC ID:	141			•

ITEM: PRESSURE RELIEF ASSEMBLY FAILURE MODE: BURST DISK FAILS TO RUPTURE, RUPTURES AT A HIGHER THAN NOMINAL PRESSURE, OR POPPET VALVE FAILS CLOSED AFTER BURST DISK RUPTURES AT NOMINAL PRESSURE.

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

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

CRITICALITIES

FUNC
1
1
1
1
•

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

LOCATION: FRCS POD PART NUMBER: FU & OX:

CAUSES: MATERIAL FLAW, CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

OVERPRESSURIZATION OF PROPELLANT TANK AND LINES WILL CAUSE TANK AND/OR LINE RUPTURE. LOSS OF PROPELLANT INTO THE POD CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 142	, 1		FICALITY LIGHT: BORT:	HDW/FUNC 3/1R 3/1R
ITEM: RELIEF FAILURE MODE: PRESSU (FAILS OPEN) OR LEAKS			FAILS TO	CLOSE
LEAD ANALYST:	SUBSYS LEAD: D.J	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) RELIEF VALVE TES 5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICALIT	TIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC 3/1R 3/1R 3/1R 3/1R 3/1R : 3/1R	ABORT RTLS: TAL: AOA: ATO:		2

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

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (BURST DISC RUPTURE) CANNOT BE DETECTED. FAILURE OF ALL REDUNDANCY WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 A, B.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 143	HIG	HEST CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: RELIEF FAILURE MODE: PRESSU (FAILS CLOSED)	VALVE TEST PORT C RE RELIEF VALVE TH	OUPLING IST PORT FAILS TO	OPEN
LEAD ANALYST:	SUBSYS LEAD: D.J.	PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) RELIEF VALVE TES 5) 6) 7) 8) 9)	SUBSYSTEM		
	CRITICALITIE	S	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC A 3/3 3/3 3/3 3/3 3/3	ABORT HDW/FUN RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	1C
REDUNDANCY SCREENS:	A[] B[] C[]	

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

C-45

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 144		HIGHEST CRITI FLI ABO	GHT: 3/3
	MANUAL ISOLATI TO CLOSE (FAIL		AKS INTERNALLY
LEAD ANALYST:	SUBSYS LEAD: D	.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) GROUND MANUAL ISO 5) 6) 7) 8) 9)	SUBSYSTEM		
	CRITICALI	TIES	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 3/3 3/3 3/3	ABORT I RTLS: TAL: AOA: ATO:	HDW/FUNC 3/3 3/3 3/3 3/3 3/3
REDUNDANCY SCREENS:	A [] B	[] c	[]

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK (GROUND HANDLING)

EFFECTS/RATIONALE: NONE.

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DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 145		HIGHEST CI	RITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 1/1
ITEM: GROUND M. FAILURE MODE: FAILS TO	ANUAL ISOLATI) REMAIN OPEN	ON VALVE (FAILS CL	OSED)	
LEAD ANALYST: SU	JBSYS LEAD: D	.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) PROP STOR & DIST S 4) GROUND MANUAL ISOL 5) 6) 7) 8) 9)	UBSYSTEM			
	CRITICAL	TTTES		
FLIGHT PHASE H PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 2/2 1/1	ABORT RTLS TAL: AOA: ATO:	HDW/FUN : 1/1 1/1 1/1 1/1	IC
REDUNDANCY SCREENS:	A []	B[]	C []	
LOCATION: FUEL/OXII PANEL PART NUMBER: FU & OX:	DIZER MANIFOL	D DRAIN, F	PURGE AND CH	
CAUSES: CONTAMINATION MECHANICAL SHOCK (GROU	, VIBRATION, ND HANDLING)	PIECE-PAR	I STRUCTURA.	L FAILURE,
EFFECTS/RATIONALE: FAILURE RESULTS IN LOSS OF HELIUM PRESSURIZATION (VALVE IS UPSTREAM OF PROPELLANT TANKS). LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.				

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT); FLIGHT RULE 6-41 C, D.

DATE: 2/26/87 H SUBSYSTEM: FRCS MDAC ID: 146	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: GROUND MANUAL ISOLATIO FAILURE MODE: LEAKS EXTERNALLY	N VALVE
LEAD ANALYST: SUBSYS LEAD: D.J	. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GROUND MANUAL ISOLATION VALVE 5) 6) 7) 8) 9)	
CRITICALIT	TES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 1/1 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1 LANDING/SAFING: 1/1	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1
REDUNDANCY SCREENS: A [] B	[] C[]

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK (GROUND HANDLING)

EFFECTS/RATIONALE:

FAILURE RESULTS IN LOSS OF PROPELLANT AND HELIUM. PROPELLANT WILL LEAK INTO THE POD CAUSING CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/ SUBSYSTEM: FRCS MDAC ID: 147	87		ITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 1/1
ITEM: PROF FAILURE MODE: LEAK	P TK ISOL VLVS I S EXTERNALLY	1/2 & 3/4/5		
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY 1) HARDWARE COMPO 2) ASSEMBLIES 3) PROP STOR & DI 4) PROP TK ISOL V 5) 6) 7) 8) 9)	onents St subsystem	⁷ 5		
	CRITICA	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFI	HDW/FUNC 1/1 1/1 1/1 1/1 1/1	ABORT RTLS: TAL: AOA: ATO:	1/1	:
REDUNDANCY SCREENS:	A[]	B[]	c []	

LOCATION: BETWEEN PROPELLANT TANK AND MANIFOLD ISOLATION VALVES PART NUMBER: FU & OX:

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN PROPELLANT LEAKING INTO POD/VEHICLE CAUSING CORROSION, WHICH CAN RESULT IN ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 148	HIGHES	T CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: PROP TK FAILURE MODE: RESTRIC	ISOL VLVS 1/2 & 3/4 TED FLOW	/5
LEAD ANALYST: S	UBSYS LEAD: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) PROP STOR & DIST S 4) PROP TK ISOL VLVS 5) 6) 7) 8) 9)	UBSYSTEM	
	CRITICALITIES	
FLIGHT PHASE H PRELAUNCH:	IDW/FUNC ABOR	HDW/FUNC LS: 1/1
LIFTOFF:		1/1
ONORBIT:	1/1 AC	•
DEORBIT:	1/1 A:	No: 1/1
LANDING/SAFING:	3/3	
REDUNDANCY SCREENS: A	A [] B []	c []
LOCATION: BETWEEN P VALVES	ROPELLANT TANK AND N	ANIFOLD ISOLATION

PART NUMBER: FU & OX:

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

SUBSYSTEM: FRCS FLI	CALITY HDW/FUNC GHT: 3/3 RT: 3/3
ITEM: PROP TK ISOL VLV 1/2 FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LE	AKS INTERNALLY
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK ISOL VLV 1/2 5) 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTPRELAUNCH:3/3RTLS:LIFTOFF:3/3TAL:ONORBIT:3/3AOA:DEORBIT:3/3ATO:	HDW/FUNC
PRELAUNCH: 3/3 RTLS:	3/3
LIFTOFF: 3/3 TAL:	3/3
ONORBIT: 3/3 AOA:	3/3
DEORBIT: 3/3 ATO:	3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C	[]]
LOCATION: BETWEEN PROPELLANT TANK AND MANIFOL VALVES PART NUMBER: FU & OX:	D ISOLATION
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STR LOSS OF SIGNAL FROM MDM	RUCTURAL FAILURE,

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

C-51

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 150	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: PROP TK ISO FAILURE MODE: FAILS TO OP		
LEAD ANALYST: SUBSY	S LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBS 4) PROP TK ISOL VLV 1/2 5) 6) 7) 8) 9)	YSTEM	
	CRITICALITIES	
LIFTOFF: 3/ ONORBIT: 3/	FUNC ABORT 3 RTI 3 TAI 2R AO2 1R ATC	LS: 1/1 L: 2/1R
REDUNDANCY SCREENS: A [2] B[P]	C [P]

LOCATION: BETWEEN PROPELLANT TANK AND MANIFOLD ISOLATION VALVES PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

REDUNDANCY IN ALL PHASES EXCEPT RTLS IS PROVIDED BY THE 3/4/5 TANK ISOLATION VALVE. FIRST FAILURE WILL CAUSE LOSS OF EIGHT PRIMARY JETS WHICH WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT DURING RTLS TO MEET THE CG SAFETY BOUNDARIES. SIMILARLY, FAILURE OF ALL REDUNDANCY (3/4/5 VALVE) WILL RESULT IN LOSS OF VEHICLE DURING ENTRY AND ALL OTHER ABORTS.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 151		HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: PROP T FAILURE MODE: FAILS	K ISOL VLV 3/4 TO CLOSE (FAII	/5 S OPEN), O	R LEAKS INT	ERNALLY
LEAD ANALYST:	SUBSYS LEAD: 1	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK ISOL VLV 5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC 3/3 3/3 3/3 3/3 3/3	ABORT	3/3	IC
REDUNDANCY SCREENS:	A[]	B[]	с[]	
LOCATION: BETWEEN VALVES PART NUMBER: FU & O	x:			
CAUSES: CONTAMINATI LOSS OF SIGNAL FROM N	ON, VIBRATION, 1DM	PIECE-PAR	T STRUCTURA	L FAILURE,

EFFECTS/RATIONALE: NONE.

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DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 152	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: PROP TK ISOL VLV 3 FAILURE MODE: FAILS TO OPEN (FAI	3/4/5 ILS CLOSED)
LEAD ANALYST: SUBSYS LEAD	: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK ISOL VLV 3/4/5 5) 6) 7) 8) 9)	
CRITIC	ALITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 1/1
LIFTOFF: 3/3	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: BETWEEN PROPELLANT VALVES PART NUMBER: FU & OX:	TANK AND MANIFOLD ISOLATION
CAUSES: CONTAMINATION, VIBRATION LOSS OF SIGNAL FROM MDM	, PIECE-PART STRUCTURAL FAILURE,
EFFECTS/RATIONALE: REDUNDANCY IN ALL PHASES EXCEPT R ISOLATION VALVE. FIRST FAILURE W JETS WHICH WILL AFFECT ONORBIT OP INABILITY TO EXPEL ENOUGH PROPELL SAFETY BOUNDARIES. SIMILARLY, FA VALVE) WILL RESULT IN LOSS OF VEH ABORTS.	ILL CAUSE LOSS OF SIX PRIMARY ERATIONS, AND MAY CAUSE ANT DURING RTLS TO MEET THE CG ILURE OF ALL REDUNDANCY (1/2

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 153	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: MANIFO FAILURE MODE: FAILS	DLD 1/2 FILL & DRAIN/PUF TO CLOSE (FAILS OPEN),	RGE COUPLING OR LEAKS EXTERNALLY
LEAD ANALYST:	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) MANIFOLD 1/2 FIL 5) 6) 7) 8) 9)		ĩG
	CRITICALITIES	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC ABORT 2/1R RTI 2/1R TAI 2/1R AOF 2/1R ATC	LS: 2/1R L: 2/1R A: 2/1R
REDUNDANCY SCREENS:	A [2] B [NA]	С[Р]

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: SUBSYSTEM: H MDAC ID: J	RCS	FLIC	CALITY HDW/FUNC SHT: 3/3 RT: 3/3
ITEM: FAILURE MODE:	MANIFOLD 1/2 FILL & FAILS TO OPEN (FAII	DRAIN/PURGE COU S CLOSED)	PLING
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL	
BREAKDOWN HIT 1) HARDWARE 2) ASSEMBLI 3) PROP STO 4) MANIFOLE 5) 6) 7) 8) 9)	COMPONENTS	GE COUPLING	
	CRITICA	LTTTES	
PRELAU LIFTOF ONORBI DEORBI	LASEHDW/FUNCVNCH:3/3VF:3/3		IDW/FUNC 3/3 3/3 3/3 3/3 3/3
REDUNDANCY SC	REENS: A []	B[] C	[]]
LOCATION:	FUEL/OXIDIZER MANIFO	LD DRAIN, PURGE	AND CHECKOUT

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

PANEL

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 155	HIGHEST	CRITICALITY FLIGHT: ABORT:	
ITEM: MANIFOL FAILURE MODE: FAILS T	D 3/4/5 FILL & DRAIN/ O CLOSE (FAILS OPEN),	PURGE COUPLIN OR LEAKS EXT	IG TERNALLY
LEAD ANALYST: S	UBSYS LEAD: D.J. PAUI	,	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) PROP STOR & DIST S 4) MANIFOLD 3/4/5 FI 5) 6) 7) 8) 9)		LING	
	CRITICALITIES		
PRELAUNCH: LIFTOFF: ONORBIT:	2/1R TA 2/1R AC 2/1R AT	HDW/FUN LS: 2/1R L: 2/1R PA: 2/1R PO: 2/1R	1C

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

LOCATION: HELIUM/FUEL/OXIDIZER SERVICING PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 156	HI	GHEST CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
	3/4/5 FILL & D OPEN (FAILS CL	RAIN/PURGE COUPLIN OSED)	łG
LEAD ANALYST: SU	BSYS LEAD: D.J.	PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SU 4) MANIFOLD 3/4/5 FILM 5) 6) 7) 8) 9)	IBSYSTEM	COUPLING	
	CRITICALITI	FS	
FLIGHT PHASE HI PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	W/FUNC 3/3 3/3 3/3 3/3 3/3 3/3 3/3		ĩC
REDUNDANCY SCREENS: A	[] B[] c[]	

LOCATION: HELIUM/FUEL/OXIDIZER SERVICING PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 157		_	TICALITY LIGHT: BORT:	3/3
ITEM: MANIFOLD FAILURE MODE: FAILS TO	l, ISOL VLV CLOSE (FAILS	S OPEN), OR	LEAKS INT	ERNALLY
LEAD ANALYST: SUB	SYS LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SU 4) MANIFOLD 1, ISOL VL 5) 6) 7) 8) 9)	BSYSTEM			
	CRITICAL	ITIES		
FLIGHT PHASE HD		ABORT RTLS: TAL:	HDW/FUN	С
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3 3/3 3/3	ATO:	3/3	
LANDING/SAFING:	3/3			
REDUNDANCY SCREENS: A	[]]	B[]	с[]	
LOCATION: BETWEEN TA PART NUMBER: FU & OX:	NK ISOLATION	N VALVES AND) THRUSTER	S
CAUSES: CONTAMINATION, LOSS OF SIGNAL FROM MDM	VIBRATION,	PIECE-PART S	STRUCTURAI	FAILURE,
EFFECTS/RATIONALE: NONE.				

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 158		-	TICALITY LIGHT: BORT:	HDW/FUNC 2/1R 1/1
ITEM: MANIFOL FAILURE MODE: FAILS T	D 1, ISOL VLV O OPEN (FAILS			
LEAD ANALYST: S	UBSYS LEAD: 1	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) PROP STOR & DIST & 4) MANIFOLD 1, ISOL V 5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	ITIES		
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	HDW/FUNC 3/3 3/3 3/2R 2/1R			:
REDUNDANCY SCREENS:	A [2]	B [P]	C[P]	

LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

REDUNDANCY IN ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON OTHER MANIFOLDS. NEXT ASSOCIATED FAILURE MAY RESULT IN INABILITY TO COMPLETE FRCS DUMP, LEADING TO POSSIBLE VIOLATION OF THE CG SAFETY BOUNDARY. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE FOUR PRIMARY JETS ON THIS MANIFOLD WILL AFFECT PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-942099 REV D EO DO1 (42BN & 42BT); RCS SFOM, FIG. 3-4.

ITEM: MANIFOLD 1, GROUND PURGE/DRAIN COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS EXTERNALLY LEAD ANALYST: SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) FROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 2/1R RTLS: 2/1R LIFTOFF: 2/1R RTLS: 2/1R LIFTOFF: 2/1R AOA: 2/1R ONORBIT: 2/1R AOA: 2/1R DEORBIT: 2/1R ATO: 2/1R LANDING/SAFING: 2/1R	DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 159	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, GROUND PURGE/DRAIN COUPLING 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	ITEM: MANIFOLD FAILURE MODE: FAILS TO	1, GROUND PURGE/DRA CLOSE (FAILS OPEN),	IN COUPLING OR LEAKS EXTERNALLY
1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9) 7) 7) 8) 9) 7) 8) 9) 7) 8) 9) 7) 8) 9) 7) 8) 9) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 8) 7) 7) 7) 8) 7) 7) 7) 7) 7) 7) 7) 7) 7) 7	LEAD ANALYST: SUB	SYS LEAD: D.J. PAUL	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:2/1RRTLS:2/1RLIFTOFF:2/1RTAL:2/1RONORBIT:2/1RAOA:2/1RDEORBIT:2/1RATO:2/1RLANDING/SAFING:2/1R2/1R	 HARDWARE COMPONENTS ASSEMBLIES PROP STOR & DIST SUB MANIFOLD 1, GROUND D 6) 7) 8) 	SYSTEM PURGE/DRAIN COUPLIN	G
PRELAUNCH:2/1RRTLS:2/1RLIFTOFF:2/1RTAL:2/1RONORBIT:2/1RAOA:2/1RDEORBIT:2/1RATO:2/1RLANDING/SAFING:2/1RATO:2/1R		CRITICALITIES	
REDUNDANCY SCREENS: A [2] B [NA] C [P]	PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	V/FUNCABORT2/1RRT2/1RTA2/1RAO2/1RAT	LS: 2/1R L: 2/1R A: 2/1R
	REDUNDANCY SCREENS: A	[2] B[NA]	С [Р]

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF THE MANIFOLD AND POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. FAILURE OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT DURING RTLS TO MEET THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 160	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: MANIFOLD 1, GROUND P FAILURE MODE: FAILS TO OPEN (FAILS	
LEAD ANALYST: SUBSYS LEAD: I	D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, GROUND PURGE/DRAIN 5) 6) 7) 8) 9)	COUPLING
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3 LIFTOFF: 3/3	RTLS: 3/3 TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	R101 373
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: FUEL/OXIDIZER MANIFOL PANEL PART NUMBER: FULL OX:	D DRAIN, PURGE AND CHECKOUT

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:161ABORT:3/3	2
ITEM: MANIFOLD 2, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, ISOL VLV 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: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:	
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM	,
EFFECTS/RATIONALE: NONE.	

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:2/1RMDAC ID:162ABORT:1/1
ITEM: MANIFOLD 2, ISOL VLV FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, ISOL VLV 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH:3/3RTLS:1/1LIFTOFF:3/3TAL:3/1R
$\begin{array}{cccc} \text{DIFFORT:} & 3/3 & \text{IAL:} & 3/1 \\ \text{ONORBIT:} & 3/2 R & \text{AOA:} & 3/1 R \end{array}$
DEORBIT: $2/1R$ ATO: $3/1R$
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

REDUNDANCY IN ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON OTHER MANIFOLDS. NEXT ASSOCIATED FAILURE MAY RESULT IN INABILITY TO COMPLETE FRCS DUMP, LEADING TO POSSIBLE VIOLATION OF THE CG SAFETY BOUNDARY. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE FOUR PRIMARY JETS ON THIS MANIFOLD WILL AFFECT PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-942099 REV D EO DO1 (43DE); RCS SFOM, FIG. 3-4.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 163	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
FAILURE MODE: FAILS TO CLOSE (F.	
LEAD ANALYST: SUBSYS LEAD	: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS	
2) ASSEMBLIES	
3) PROP STOR & DIST SUBSYSTEM	
4) MANIFOLD 2, GROUND PURGE/DR.	AIN COUPLING
5) 6)	
7)	
8)	
9)	
CRITI	CALITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 2/1R	RTLS: 2/1R
LIFTOFF: 2/1R ONORBIT: 2/1R	TAL: 2/1R
	AOA: 2/1R
DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 2/1R	
REDUNDANCY SCREENS: A [2]	B[NA] C[P]

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF THE MANIFOLD AND POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. FAILURE OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT DURING RTLS TO MEET THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 164	HIGHEST C	RITICALITYHDW/FUNCFLIGHT:3/3ABORT:3/3
	LD 2, GROUND PURGE/DRAIN TO OPEN (FAILS CLOSED)	COUPLING
LEAD ANALYST:	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) MANIFOLD 2, GROUN 5) 6) 7) 8) 9)		
	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC ABORT	HDW/FUNC
PRELAUNCH:	3/3 RTLS:	
LIFTOFF:	3/3 TAL:	3/3
ONORBIT:	3/3 AOA:	3/3
DEORBIT:	3/3 ATO:	
LANDING/SAFING:	3/3	
REDUNDANCY SCREENS:	A[] B[]	c []
LOCATION: FUEL/OXI PANEL	DIZER MANIFOLD DRAIN, PU	RGE AND CHECKOUT

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

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DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:165ABORT:3/3
ITEM: MANIFOLD 3, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, ISOL VLV 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
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: $3/3$ AOA: $3/3$
ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM
EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 166	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: MANIFOLD 3, ISOL VLV FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)		
LEAD ANALYST: SUBS	YS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, ISOL VLV 5) 6) 7) 8) 9)		
CRITICALITIES		
PRELAUNCH:3LIFTOFF:3ONORBIT:3	/FUNC ABORT /3 RTI /3 TAI /2R AOF /1R ATC	LS: 1/1 L: 2/1R L: 2/1R
REDUNDANCY SCREENS: A	[2] B[P]	С[Р]

LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

REDUNDANCY IN ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON OTHER MANIFOLDS. NEXT ASSOCIATED FAILURE MAY RESULT IN INABILITY TO COMPLETE FRCS DUMP, LEADING TO POSSIBLE VIOLATION OF THE CG SAFETY BOUNDARY. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE FOUR PRIMARY JETS ON THIS MANIFOLD WILL AFFECT PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-942099 REV D EO DO1 (43DE); RCS SFOM, FIG. 3-4.

DATE: SUBSYSTEM: FR MDAC ID: 16	CS	HIGHEST (CRITICALITY FLIGHT: ABORT:	2/1R
ITEM: FAILURE MODE:	MANIFOLD 3, GROUND FAILS TO CLOSE (FAI	PURGE/DRAID	N COUPLING OR LEAKS EXI	ERNALLY
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIER 1) HARDWARE (2) ASSEMBLIE 3) PROP STOR 4) MANIFOLD 5) 6) 7) 8) 9)	COMPONENTS	IN COUPLING		
	CRITIC			
FLIGHT PHA		ABORT	HDW/FUN S: 2/1R	IC
PRELAUN LIFTOFF		TAL		

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]

FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT LOCATION: PANEL

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF THE MANIFOLD AND POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. FAILURE OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT DURING RTLS TO MEET THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE:2/26/87HIGHEST CRITICALITYHDW/FSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:168ABORT:3/3	
ITEM: MANIFOLD 3, GROUND PURGE/DRAIN COUPLING FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9)	
CRITICALITIES	
FLICHT PHASE HOW/FILLO ABORT HOW/FILLO	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3	
LIFTOFF: 3/3 TAL: 3/3	
ONORBIT: 3/3 AOA: 3/3	
DEORBIT: 3/3 ATO: 3/3	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL PART NUMBER: FU & OX:	

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:169ABORT:3/3				
ITEM: MANIFOLD 4, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY				
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, ISOL VLV 5) 6) 7) 8) 9)				
CRITICALITIES				
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:				
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM				

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

C-71

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 170		-	TICALITY LIGHT: BORT:	HDW/FUNC 2/1R 1/1
ITEM: MANIFO FAILURE MODE: FAILS	LD 4, ISOL VLV TO OPEN (FAIL			
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) MANIFOLD 4, ISOL 5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 3/2R 2/1R		1/1 2/1R	:
REDUNDANCY SCREENS:	A [2]	B [P]	C[P]	

LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

REDUNDANCY IN ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION ON OTHER MANIFOLDS. NEXT ASSOCIATED FAILURE MAY RESULT IN INABILITY TO COMPLETE FRCS DUMP, LEADING TO POSSIBLE VIOLATION OF THE CG SAFETY BOUNDARY. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE FOUR PRIMARY JETS ON THIS MANIFOLD WILL AFFECT PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-942099 REV D EO DO1 (43DE); RCS SFOM, FIG. 3-4.

DATE: 2/26/83 SUBSYSTEM: FRCS MDAC ID: 171	7		TICALITY LIGHT: ABORT:	
ITEM: MANIF FAILURE MODE: FAILS	OLD 4, GROUND PU TO CLOSE (FAILS	RGE/DRAIN (OPEN), OR	COUPLING LEAKS EXT	ERNALLY
LEAD ANALYST:	SUBSYS LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONI 2) ASSEMBLIES 3) PROP STOR & DIST 4) MANIFOLD 4, GROU 5) 6) 7) 8) 9)	SUBSYSTEM	COUPLING		
	CRITICALI	TIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	2/1R 2/1R 2/1R 2/1R	RTLS: TAL:	2/1R 2/1R 2/1R	
REDUNDANCY SCREENS:	A[2] B	[NA]	С[Р]	

LOCATION: FUEL/OXIDIZER MANIFOLD DRAIN, PURGE AND CHECKOUT PANEL

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF THE MANIFOLD AND POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. FAILURE OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT DURING RTLS TO MEET THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 172 ITEM: MANIFO		IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3 GE/DRAIN COUPLING		
FAILURE MODE: FAILS	TO OPEN (FAILS C	LOSED)		
LEAD ANALYST:	SUBSYS LEAD: D.J	. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9)				
	CRITICALIT	IES		
FLIGHT PHASE		ABORT HDW/FUNC		
PRELAUNCH:	3/3	RTLS: 3/3		
LIFTOFF:	3/3	TAL: 3/3		
ONORBIT:	3/3	AOA: 3/3		
DEORBIT:	3/3 3/3 3/3	ATO: 3/3		
LANDING/SAFING	: 3/3			
REDUNDANCY SCREENS:	A [] B	[] C[]		
LOCATION: FUEL/OX PANEL	IDIZER MANIFOLD I	DRAIN, PURGE AND CHECKOUT		
PART NUMBER: FU & OX	•			
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE				
EFFECTS/RATIONALE: NONE.				

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 173		RITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: MANIFOLD 5, IS FAILURE MODE: FAILS TO CLOSE	OL VLV C (FAILS OPEN), O	R LEAKS INTERNALLY
LEAD ANALYST: SUBSYS	LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYST 4) MANIFOLD 5, ISOL VLV 5) 6) 7) 8) 9)	EM	
c	ITICALITIES	
FLIGHT PHASE HDW/FUI PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	IC ABORT	HDW/FUNC
PRELAUNCH: 3/3	RTLS	: 3/3
LIFTOFF: 3/3	TAL:	3/3
ONORBIT: 3/3	AOA:	3/3
DEORBIT: 3/3	ATU:	5/5
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [В[]	c []
LOCATION: BETWEEN TANK IS PART NUMBER: FU & OX:	SOLATION VALVES A	ND THRUSTERS
CAUSES: CONTAMINATION, VIBR LOSS OF SIGNAL FROM MDM	ATION, PIECE-PART	STRUCTURAL FAILURE,
EFFECTS/RATIONALE: NONE.		

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:2/2MDAC ID:174ABORT:3/3	!			
ITEM: MANIFOLD 5, ISOL VLV FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)				
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, ISOL VLV 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				
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: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX:				
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM				
EFFECTS/RATIONALE:				

FAILURE RESULTS IN LOSS OF VRCS.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 175	HIGHEST (CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: MANIFOL FAILURE MODE: FAILS TO	D 5, GROUND PURGE/DRAID O CLOSE (FAILS OPEN), (N COUPLING OR LEAKS EXTERNALLY
LEAD ANALYST: S	UBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) PROP STOR & DIST S 4) MANIFOLD 5, GROUND 5) 6) 7) 8) 9)		
	CRITICALITIES	
FLIGHT PHASE	HDW/FUNC ABORT 2/1R RTL	HDW/FUNC
PRELAUNCH:	2/1R RTL	S: 2/1R
LIFTOFF: ONORBIT:	2/1R TAL	: 2/1R
ONORBIT:	2/1R AOA	: 2/1R
DEORBIT:	2/1R ATO	: 2/1R
LANDING/SAFING:		
REDUNDANCY SCREENS:	A[2] B[NA]	С[Р]
LOCATION: FUEL/OXII	DIZER MANIFOLD DRAIN,	PURGE AND CHECKOUT

PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PANEL

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF THE MANIFOLD AND POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 176	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: MANIFOLD 5, GROUND I FAILURE MODE: FAILS TO OPEN (FAIL	PURGE/DRAIN COUPLING S CLOSED)
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, GROUND PURGE/DRAIN 5) 6) 7) 8) 9)	N COUPLING
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: FUEL/OXIDIZER MANIFO PANEL PART NUMBER: FU & OX:	LD DRAIN, PURGE AND CHECKOUT
CAUSES: CONTAMINATION, VIBRATION,	PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

VALVE NORMALLY CLOSED.

HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 2/26/87 DATE: 1/1 SUBSYSTEM: FRCS ABORT: MDAC ID: 177 MANIFOLD ISOL VLVS ITEM: FAILURE MODE: LEAKS EXTERNALLY LEAD ANALYST: SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD ISOL VLVS 5) 6) 7) 8) 9) CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:1/11/1 LANDING/SAFING: 1/1 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX: CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE FAILURE RESULTS IN PROPELLANT LEAKING INTO POD/VEHICLE WHICH WILL CAUSE CORROSION, RESULTING IN ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 1/1 MDAC ID: 178 ABORT: 1/1 ITEM: MANIFOLD ISOL VLVS FAILURE MODE: RESTRICTED FLOW LEAD ANALYST: SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD ISOL VLVS 5) 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: RTLS: 1/1 3/3 LIFTOFF: 1/1 1/1 TAL: 1/1 ONORBIT: AOA: 1/1 DEORBIT: 1/1 ATO: LANDING/SAFING: 3/3 1/1 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: BETWEEN TANK ISOLATION VALVES AND THRUSTERS PART NUMBER: FU & OX: CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, CAUSING ZOTS AND/OR NOZZLE BURNTHROUGH, RESULTING IN LOSS OF VEHICLE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 179	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1		
ITEM: JET ALIGNMENT BELLOWS FAILURE MODE: STRUCTURAL FAILURE (1	5, PRIMARY, ALL AXES RUPTURE OR LEAK)		
LEAD ANALYST: SUBSYS LEAD: D	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) JET ALIGNMENT BELLOWS, PRIMARY, ALL AXES 5) 6) 7) 8) 9)			
CRITICAL	ITIES		
	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1		
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: FUEL/OXIDIZER LINES LI VALVE PART NUMBER: FU & OX:	EADING INTO JET BIPROPELLANT		

CAUSES: HIGH PRESSURE, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: THIS FAILURE CAUSES PROPELLANT TO LEAK INTO THE POD/VEHICLE. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 180	HIGHEST C	RITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: JET ALIGN FAILURE MODE: RESTRICTN	NMENT BELLOWS, PRIMARY ED FLOW	, ALL AXES
LEAD ANALYST: SU	BSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SU 4) JET ALIGNMENT BELLO 5) 6) 7) 8) 9)	JBSYSTEM	
	CRITICALITIES	
FLIGHT PHASE HI PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	DW/FUNC ABORT 3/3 RTLS 1/1 TAL: 1/1 AOA: 1/1 ATO: 3/3 3	1/1 1/1
REDUNDANCY SCREENS: A	[] B[]	c[]
LOCATION: FUEL/OXIDI VALVE PART NUMBER: FU & OX:	ZER LINES LEADING INT	D JET BIPROPELLANT

CAUSES: VACUUM, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND LOSS OF VEHICLE.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 181	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: THRUSTER FAILURE MODE: FAILS TO	BIPROP SOLENOID VLV, PRIMARY, ALL AXES CLOSE (FAILS OPEN/ON)
LEAD ANALYST: SUB	SYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLU 5) 6) 7) 8) 9)	ENOID VLV, PRIMARY, ALL AXES
	CRITICALITIES
LIFTOFF: ONORBIT:	1/1 RTLS: 1/1 1/1 TAL: 1/1 1/1 AOA: 1/1 1/1 ATO: 1/1
REDUNDANCY SCREENS: A	[] B[] C[]
LOCATION: JET ASSEMB	LY

LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

A FAILED-ON JET CAN CAUSE CONTACT WITH PAYLOADS DURING RENDEZVOUS, RESULTING IN LOSS OF VEHICLE AND/OR EVA CREW. RM WILL NOT DESELECT JET; MUST BE SECURED BY CREW CLOSING ITS MANIFOLD. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:1/1MDAC ID:182ABORT:1/1
ITEM: THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES FAILURE MODE: LEAKS EXTERNALLY, ONE PROPELLANT
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 1/1 RTLS: 1/1
LIFTOFF: 1/1 TAL: 1/1
ONORBIT: 1/1 AOA: 1/1
DEORBIT: 1/1 ATO: 1/1
LANDING/SAFING: 1/1
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LEAKING INTO POD/VEHICLE, CAUSING CORROSION, RESULTING IN ELECTRICAL SHORTS AND PROPELLANT IGNITION.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

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DATE: 2/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 1/1 MDAC ID: 183 ABORT: 1/1		
ITEM: THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES FAILURE MODE: RESTRICTED FLOW		
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV, PRIMARY, ALL AXES 5) 6) 7) 8) 9)		
CRITICALITIES		
CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:3/33/3ABORT		
REDUNDANCY SCREENS: A [] B [] C []		
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:		
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE		
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.		

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LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM, LOW TEMPERATURE FREEZES PROPELLANT IN VALVE

EFFECTS/RATIONALE:

REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION. RM WILL DESELECT JET. FAILURE CANNOT BE DETECTED UNTIL JET TRIES TO FIRE. LOSS OF ALL REDUNDANCY AFFECTS ONORBIT OPERATIONS.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 185	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 3/3
ITEM: THRUSTE FAILURE MODE: LEAKS I	R BIPROP SOLENOID VLV INTERNALLY, ONE PROPELI	, PRIMARY, -X AXIS LANT
LEAD ANALYST:	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) THRUSTER SUBSYSTE 4) THRUSTER BIPROP S 5) 6) 7) 8) 9)		-X AXIS
	CRITICALITIES	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	HDW/FUNC ABORT	LS: 3/3 L: 3/3
ONORBIT:	1/1 AO	A: 3/3
DEORBIT: LANDING/SAFING:	3/3 ATC 1/1	0: 3/3
REDUNDANCY SCREENS:	A[] B[]	c []
LOCATION: JET ASSE PART NUMBER: FU & OX:		

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN PROPELLANT LEAKING INTO COMBUSTION CHAMBER, WHICH CAN FREEZE, RESULTING IN LOSS OF THE JET. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE. LEAKAGE ONORBIT CAN CAUSE LOSS OF LIFE FOLLOWING EVA IF CREW IS CONTAMINATED BY PROPELLANTS.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 186	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: THRUSTER BIPR FAILURE MODE: FAILS TO OPEN	OP SOLENOID VLV, PRIMARY, Y AXIS (FAILS CLOSED)
LEAD ANALYST: SUBSYS	LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID 5) 6) 7) 8) 9)	O VLV, PRIMARY, Y AXIS
CI	RITICALITIES
	IC ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R
REDUNDANCY SCREENS: A [2] B[P] C[P]

LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM, LOW TEMPERATURE FREEZES PROPELLANT IN VALVE

EFFECTS/RATIONALE:

REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION. RM WILL DESELECT JET. FAILURE CANNOT BE DETECTED UNTIL JET TRIES TO FIRE. NEXT ASSOCIATED FAILURE ONORBIT MAY CAUSE CONTACT WITH PAYLOADS AND/OR EVA CREW AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ABORTS AND ENTRY TO MEET THE CG SAFETY BOUNDARIES. FAILURE DURING RTLS MAY RESULT IN THE INABILITY TO COMPLETE A FRCS DUMP.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:1/1MDAC ID:187ABORT:3/3
ITEM: THRUSTER BIPROP SOLENOID VLV, PRIMARY, Y AXIS FAILURE MODE: LEAKS INTERNALLY, ONE PROPELLANT
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV, PRIMARY, Y AXIS 5) 6) 7) 8) 9)
CRITICALITIES
FLICHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAINCH: $1/1$ RTLS: $3/3$
LIETOFF: $3/3$ TAL: $3/3$
PRELAUNCH:1/1RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:1/1AOA:3/3DEORBIT:3/1RATO:3/3
LANDING/SAFING: 1/1
LANDING/SATING. 1/1
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN PROPELLANT LEAKING INTO COMBUSTION CHAMBER, WHICH CAN FREEZE, RESULTING IN LOSS OF THE JET. FAILURE OF ALL REDUNDANCY MAY CAUSE INABILITY TO DUMP ENOUGH PROPELLANTS DURING ENTRY OR ABORTS TO MEET THE CG SAFETY BOUNDARIES. LEAKAGE ONORBIT CAN CAUSE LOSS OF LIFE FOLLOWING EVA IF CREW IS CONTAMINATED BY PROPELLANTS. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUISUBSYSTEM:FRCSFLIGHT:3/2RMDAC ID:188ABORT:3/3	
ITEM: THRUSTER BIPROP SOLENOID VLV, PRIMARY, Z AXIS FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV, PRIMARY, Z AXIS 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: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM, LOW TEMPERATURE FREEZES PROPELLANT IN VALVE

EFFECTS/RATIONALE:

REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION. RM WILL DESELECT JET. FAILURE CANNOT BE DETECTED UNTIL JET TRIES TO FIRE.

DATE:2/26/87HIGHEST CRITICALITYHDW/SUBSYSTEM:FRCSFLIGHT:1/MDAC ID:189ABORT:3/	1
ITEM: THRUSTER BIPROP SOLENOID VLV, PRIMARY, Z AXIS FAILURE MODE: LEAKS INTERNALLY, ONE PROPELLANT	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV, PRIMARY, Z AXIS 5) 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:1/1AOA:3/3DEORBIT:3/1RATO:3/3LANDING/SAFING:1/1	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:	

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN PROPELLANT LEAKING INTO COMBUSTION CHAMBER, WHICH CAN FREEZE, RESULTING IN LOSS OF THE JET. INHALATION OF PROPELLANT ON THE GROUND CAN CAUSE LOSS OF LIFE. LEAKAGE ONORBIT CAN CAUSE LOSS OF LIFE FOLLOWING EVA IF CREW IS CONTAMINATED BY PROPELLANTS.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:1/1MDAC ID:190ABORT:1/1		
ITEM: JET ALIGNMENT BELLOWS, VERNIER, ALL AXES FAILURE MODE: STRUCTURAL FAILURE (RUPTURE OR LEAK)		
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) JET ALIGNMENT BELLOWS, VERNIER, ALL AXES 5) 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 1/1 RTLS: 1/1 LIFTOFF: 1/1 TAL: 1/1 ONOPBIT: 1/1 NON: 1/1		
PRELAUNCH:1/1RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO: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: FUEL/OXID LINES LEADING INTO JET BIPROP VALVE PART NUMBER: FU & OX:		
CAUSES: HIGH PRESSURE, VIBRATION, PIECE-PART STRUCTURAL FAILURE		
EFFECTS/RATIONALE:		
THIS FAILURE CAUSES PROPELLANT TO LEAK INTO POD/VEHICLE. LOSS OF		
PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND		
PROPELLANT IGNITION. FAILURE CAUSES HAZARD TO GROUND CREW.		
REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6;		
VS70-942099 REV D EO DOL (42BN & 42BT).		

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 191	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 3/3	
ITEM: JET ALIGNM FAILURE MODE: RESTRICTED	MENT BELLOWS, VERNIER, ALL AXES D FLOW	
LEAD ANALYST: SUBS	SYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) JET ALIGNMENT BELLOWS, VERNIER, ALL AXES 5) 6) 7) 8) 9)		
	CRITICALITIES	
FLIGHT PHASE HDW	CRITICALITIESV/FUNCABORTHDW/FUNC3/3RTLS:3/33/3TAL:3/31/1AOA:3/33/3ATO:3/3	
PRELAUNCH: 3	3/3 RTLS: 3/3	
LIFTOFF: 3	3/3 TAL: 3/3	
ONORBIT: 1	L/1 AOA: 3/3	
DEORBIT: 3	ATO: 3/3	
LANDING/SAFING: 3	3/3	
REDUNDANCY SCREENS: A ([] B[] C[]	
LOCATION: FUEL/OXID I PART NUMBER: FU & OX:	LINES LEADING INTO JET BIPROP VALVE	
CAUSES: VACUUM, PIECE-PA	ART STRUCTURAL FAILURE	
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND LOSS OF VEHICLE.		
REFERENCES: JSC 11174, S VS70-942099 REV D EO DO1	SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; (42BN).	

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:1/1MDAC ID:192ABORT:3/3
ITEM: THRUSTER BIPROP SOLENOID VLV, VERNIERS, ALL AXES FAILURE MODE: FAILS TO CLOSE (FAILS OPEN/ON)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV, VERNIERS, ALL AXES 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: 1/1 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []

LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN LOSS OF VERNIER RCS. RM WILL NOT DESELECT JET, MUST BE SECURED BY CREW CLOSING ITS MANIFOLD. A FAILED ON JET CAN CAUSE CONTACT WITH PAYLOADS DURING RENDEZVOUS, RESULTING IN LOSS OF VEHICLE, AND/OR EVA CREW.

SUBSYSTEM: FRCS MDAC ID: 193	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/2 ABORT: 3/3				
ITEM: THRUSTER BIPROP SO FAILURE MODE: FAILS TO OPEN (FAI	LS CLOSED)				
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV 5) 6) 7) 8) 9)	, VERNIERS, ALL AXES				
CRITIC	ALITIES				
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/2 DEORBIT: 3/3	ABORT HDW/FUNC				
PRELAUNCH: 3/3	RTLS: 3/3				
LIFTOFF: 3/3	TAL: 3/3				
ONORBIT: 2/2	AUA: 3/3				
LANDING/SAFING: 3/3	A10. 373				
REDUNDANCY SCREENS: A []	в[] С[]				
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:					
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM, LOW TEMPERATURE FREEZES PROPELLANT IN VALVE					
EFFECTS/RATIONALE: FAILURE RESULTS IN LOSS OF VERNIER RCS. RM WILL DESELECT JETS. FAILURE CANNOT BE DETECTED UNTIL JET IS COMMANDED TO FIRE.					

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 194	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1					
ITEM: THRUSTER BIPROP S FAILURE MODE: LEAKS EXTERNALLY,	OLENOID VLV, VERNIERS, ALL AXES ONE PROPELLANT					
LEAD ANALYST: SUBSYS LEAD	D: D.J. PAUL					
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLV, VERNIERS, ALL AXES 5) 6) 7) 8) 9)						
CRITI	CALITIES					
FLIGHT PHASE HDW/FUNC PRELAUNCH: 1/1 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1 LANDING/SAFING: 1/1	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1					
REDUNDANCY SCREENS: A []	B[] C[]					
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:						
CAUSES: CONTAMINATION, PIECE-PA	RT STRUCTURAL FAILURE					
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LE. CORROSION, RESULTING IN ELECTRIC. IGNITION.	AKING INTO POD/VEHICLE CAUSING AL SHORTS AND PROPELLANT					

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.6; VS70-942099 REV D EO DO1 (42BN & 42BT).

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 195	1		CRITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 3/3
ITEM: THRUSTER BI FAILURE MODE: LEAKS INTER	PROP SOLEN NALLY, ONE	OID VLV, PROPELLA	VERNIERS, A NT	ALL AXES
LEAD ANALYST: SUBSY	S LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLEN(5) 6) 7) 8) 9)	DID VLV, V	ERNIERS,	ALL AXES	
	CRITICALI	TIES		
FLIGHT PHASE HDW/ PRELAUNCH: 1/ LIFTOFF: 3/ ONORBIT: 1/ DEORBIT: 3/ LANDING/SAFING: 1/	FUNC	ABORT	HDW/FU	NC
PRELAUNCH: 1/	1	RTL	S: 3/3	
LIFTOFF: 3/	3	TAL	: 3/3	
ONORBIT: 1/	1	AOA	: 3/3	
DEORBIT: 3/	3	ATO	: 3/3	
LANDING/SAFING: 1/	1			
REDUNDANCY SCREENS: A [] B	[]	c []	
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:				
CAUSES: CONTAMINATION, PI	ECE-PART S	TRUCTURA	L FAILURE	
EFFECTS/RATIONALE:	ANT LEAKIN	G INTO CO	OMBUSTION C	HAMBER,

FAILURE RESULTS IN PROPELLANT LEAKING INTO COMBUSTION CHAMBER, WHICH CAN FREEZE, RESULTING IN LOSS OF THE VERNIER RCS. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE. LEAKAGE ONORBIT CAN CAUSE LOSS OF LIFE FOLLOWING EVA IF CREW IS CONTAMINATED BY PROPELLANT.

DATE: 2/26/87 SUBSYSTEM: FRCS MDAC ID: 196	:	HIGHEST CRITICALITY FLIGHT: ABORT:	1/1		
ITEM: THRUSTEN FAILURE MODE: RESTRICT	R BIPROP SOLEN TED FLOW	DID VLV, VERNIERS,	ALL AXES		
LEAD ANALYST: SI	JBSYS LEAD: D.	J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SC 5) 6) 7) 8) 9)		ERNIERS, ALL AXES			
	CRITICALIT	TTPC			
FLIGHT PHASE H	DW/FIINC		NC		
PRELAUNCH:	3/3	RTLS: 3/3			
LIFTOFF:	3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3			
ONORBIT:	1/1	AOA: 3/3			
DEORBIT:	3/3	ΔTO: 3/3			
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3	AIO. 5/5			
REDUNDANCY SCREENS: A		[] c []			
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:					
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE					
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND LOSS OF VEHICLE.					

DATE: SUBSYSTEM: MDAC ID:	2/26/87 FRCS 197			HIGHI	F	TICALITY LIGHT: BORT:	
ITEM:		ER COM	BUSTION	CHAMB	ER OR N	IOZZLE EX	TENSION,
PRIMARY, AL FAILURE MOD BURNTHROUGH	E: THRUSTE	R COM	BUSTION	CHAMB	ER OR N	OZZLE EX	TENSION
LEAD ANALYS	iT: 5	SUBSYS	LEAD:	D.J. P	AUL		
2) ASSEME	RE COMPONEN	M	AMBER C	R NOZZ	LE EXTE	ENSION, F	PRIMARY,
			CRITICA	LITIES			
FLIGHT PREI LIFT	PHASE AUNCH: OFF: BIT: BIT: DING (SAFING)	HDW/F 3/3 1/1	UNC	AB	ORT RTLS: TAL:	HDW/FU 1/1 1/1	INC
ONOF DEOF LANI	BIT: BIT: DING/SAFING:	1/1 1/1 3/3	- - -		AOA: ATO:	1/1 1/1	
REDUNDANCY	SCREENS:	A []	В [1	c[]	l
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:							
CAUSES: IMPROPER MIXTURE RATIO FROM RESTRICTED PROPELLANT FLOW, PIECE-PART STRUCTURAL FAILURE							
EFFECTS/RAT HOT, HIGH I	TIONALE: PRESSURE GA	S VEN	TS INTO	POD.			

DATE:	2/26/87	HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT: 1/1
MDAC ID:	198	ABORT: 3/3

ITEM: THRUSTER COMBUSTION CHAMBER OR NOZZLE EXTENSION, VERNIER, ALL AXES FAILURE MODE: THRUSTER COMBUSTION CHAMBER OR NOZZLE EXTENSION BURNTHROUGH

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

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BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER COMBUSTION CHAMBER OR NOZZLE EXTENSION, VERNIER,
- ALL AXES
- 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:	1/1	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		, -
	•		

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

LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: IMPROPER MIXTURE RATIO FROM RESTRICTED PROPELLANT FLOW, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN LOSS OF VRCS. HOT, HIGH PRESSURE GAS VENTING INTO POD.

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DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 199	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1				
ITEM: HELIUM STORAGE TANK FAILURE MODE: STRUCTURAL FAILURE	(RUPTURE OR LEAK)				
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HELIUM STORAGE TANK 5) 6) 7) 8) 9)					
CRITICA	LITIES				
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/2 DEORBIT: 1/1 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1				
REDUNDANCY SCREENS: A []	B[] C[]				
REDUNDANCI SCREENS. A [] D [

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE: SUBSYSTEM: ARC MDAC ID: 200		HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: FAILURE MODE:	HELIUM FILL COUPLING FAILS TO CLOSE (FAIL	s open), of	R LEAKS	
LEAD ANALYST:	SUBSYS LEAD: D	.J. PAUL		
BREAKDOWN HIERA 1) HARDWARE C 2) ASSEMBLIES 3) HE PRESS S 4) HELIUM FIL 5) 6) 7) 8) 9)	COMPONENTS 5 5 5005ystem			
	CRITICALI	TIES		
FLIGHT PHAS PRELAUNC LIFTOFF: ONORBIT: DEORBIT: LANDING/	E HDW/FUNC EH: 3/3 3/3 3/2R 2/1R	ABORT RTLS: TAL: AOA: ATO:	2/1R	:

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

LOCATION: OMS/RCS FUEL SERVICING PANEL PART NUMBER: FU & OX: MC276-0017-402,403

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

SUBS	: YSTEM: ID:		7	HIGHES	r CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM FAIL	: URE MOD	HELIUN E: FAILS	M FILL COUP TO OPEN (F	LING AILS CLOSED)	
LEAD	ANALYS	T:	SUBSYS LEA	D.J. PAU	L	
1) 2) 3)	HARDWAN ASSEMB HE PRES	IERARCHY: RE COMPONI LIES SS SUBSYST FILL COUT	TEM			
			CRIT	ICALITIES		
	PREL LIFT ONOR DEOR	AUNCH: OFF: BIT: BIT:	HDW/FUNC 3/3 3/3 3/3 3/3	ABOR R T A	T HDW/FU TLS: 3/3 AL: 3/3 OA: 3/3 TO: 3/3	NC
	LAND	ING/SAFIN	G: 3/3			
		SCREENS:	_	B[]		
LOCATION: OMS/RCS FUEL SERVICING PANEL PART NUMBER: FU & OX: MC276-0017-0402,0403						
CAUS	SES: CO	NTAMINATI	ON, VIBRAT	ION, PIECE-P	PART STRUCTUR	AL FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS		FLIGHT:	3/1R
MDAC ID:	202		ABORT:	3/1R

ITEM: HE ISOL A & B VLVS FAILURE MODE: FAILS TO CLOSE (FAILS OPEN) OR LEAKS INTERNALLY

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) HE PRESS SUBSYSTEM
- 4) HE ISOL A & B VLVS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICA	LITIES	
HDW/FUNC 3/1R 3/1B	ABORT RTLS:	HDW/FUNC 3/1R
3/1R 3/1R 3/3	AOA: ATO:	3/1R 3/1R 3/1R
	HDW/FUNC 3/1R 3/1R 3/1R 3/1R	3/1R RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

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

LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0419-0012,0011 or 0022,0021

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE DUAL SERIES PRESSURE REGULATOR AND MANUAL OPERATION OF THE HELIUM ISOLATION VALVE. FAILURE OF ALL REDUNDANCY WILL CAUSE OVERPRESSURIZATION OF TANKS AND/OR LINES, AND MAY CAUSE ZOTS.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 203	7	HIGHEST CRI	ITICALITY FLIGHT: ABORT:	2/1R	
ITEM: HE IS FAILURE MODE: FAILS	OL A & B VLVS TO OPEN (FAILS	CLOSED)			
LEAD ANALYST:	SUBSYS LEAD: I	D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPON 2) ASSEMBLIES 3) HE PRESS SUBSYS 4) HE ISOL A & B VI 5) 6) 7) 8) 9)	rem				
	CRITICAL	LITIES			
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	HDW/FUNC	ABORT	HDW/FUN	IC	
DDFLAINCH.	3/3	RTLS:	2/1R		
TEMORE.	3/3	TAL:	2/1R		
	3/3	AOA:	2/1R		
ONORBIT:	3/2R	አጥር •	2/1R		
DEORBIT:	2/1R	AIV.	2/ 210		
LANDING/SAFIN	G: 3/3				
REDUNDANCY SCREENS:	A [2]	B [NA]	C [P]		
LOCATION: OMS/RC PART NUMBER: FU & O	S POD X: MC284-00419	-0012,0011 0	r 0022,002	21	
CAUSES: CONTAMINATI LOSS OF SIGNAL FROM 1	ON, VIBRATION, MDM	PIECE-PART	STRUCTURA	L FAILURE,	
EFFECTS/RATIONALE: STANDBY REDUNDANCY. NEXT ASSOCIATED FAILURE (OTHER VALVE A OR B) WILL CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.					
REFERENCES: JSC 111 VS70-943099 REV B EC AND 6-95.	.74, SPACE SHUT D B12 (43DA); F1	TLE SYSTEMS LIGHT RULE 6	HANDBOOK, -8C, 6-41	11.5; G, H, I	

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:1/1MDAC ID:204ABORT:1/1
ITEM: HE LINE, ALL EXCEPT ISOL VLV TO PRESS REGULATOR FAILURE MODE: STRUCTURAL FAILURE (RUPTURE OR LEAK)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE LINE, ALL EXCEPT ISOL VLV TO PRESS REGULATOR 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:3/3TAL:1/1ONORBIT:2/2AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:3/33/31/1
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: BETWEEN HELIUM TANK AND QUAD CHECK VALVE PART NUMBER: FU & OX:

CAUSES: VIBRATION, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:

FAILURE WILL RESULT IN LOSS OF HELIUM PRESSURIZATION, WHICH WILL AFFECT ONORBIT OPERATIONS AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ABORTS OR ENTRY TO MEET THE CG SAFETY BOUNDARIES.

SUBSYSTEM: ARCS MDAC ID: 205	HEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: HE LINE, ALL EXCEPT ISOL FAILURE MODE: RESTRICTED FLOW	
LEAD ANALYST: SUBSYS LEAD: D.J.	PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE LINE, ALL EXCEPT ISOL VLV TO PR 5) 6) 7) 8) 9)	ESS REGULATOR
CRITICALITIE	S
FLIGHT PHASE HDW/FUNC A PRELAUNCH: 3/3 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1 LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:1/1TAL:1/1AOA:1/1ATO:1/1
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: BETWEEN HELIUM TANK AND Q PART NUMBER: FU & OX: CAUSES: CONTAMINATION, PIECE-PART STRU	
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELL RESULTING IN ZOTS AND/OR THRUSTER NOZZI VEHICLE.	ANT MIXTURE RATIO, LE BURNTHROUGH AND LOSS OF

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 206		HIGHEST CF	RITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: HE LIN FAILURE MODE: STRUCT	E, ISOL VLV TO URAL FAILURE (R	PRESS REGU UPTURE OR	JLATOR LEAK)	
LEAD ANALYST:	SUBSYS LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) HE PRESS SUBSYSTE 4) HE LINE, ISOL VLX 5) 6) 7) 8) 9)	EM	LATOR		
	CRITICALI	CIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:		
LIFTOFF:	3/2R	TAL:		
ONORBIT:	3/2R	AOA:		
DEORBIT:	2/1R	ATO:	2/1R	
LANDING/SAFING:	3/3		,	

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

LOCATION: BETWEEN HELIUM ISOL VLVS AND PRESS REG PART NUMBER: FU & OX:

CAUSES: VIBRATION, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY PARALLEL HELIUM PATH. NEXT ASSOCIATED FAILURE CAUSES LOSS OF HELIUM PRESSURIZATION. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND/OR CG SAFETY BOUNDARIES TO BE EXCEEDED DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 207			CICALITY LIGHT: SORT:	HDW/FUNC 2/1R 2/1R
ITEM: HE LINE, FAILURE MODE: RESTRICT	ISOL VLV TO TED FLOW	PRESS REGULA	TOR	
LEAD ANALYST: SI	UBSYS LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HE LINE, ISOL VLV 5) 6) 7) 8) 9)	1	ILATOR		
	CRITICAL	TTES		
PRELAUNCH: LIFTOFF:	HDW/FUNC 3/3 2/1R 2/1R 2/1R 2/1R	ABORT RTLS: TAL: AOA: ATO:	HDW/FUN 2/1R 2/1R 2/1R 2/1R 2/1R	C
REDUNDANCY SCREENS:	A [2]	В[Р]	С[Р]	

LOCATION: ANY LINE BETWEEN PROPELLANT TANK AND THRUSTERS. PART NUMBER: FU & OX:

CAUSES: VIBRATION, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY PARALLEL HELIUM PATH. FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

	SYSTEM:	2/26/87 ARCS 208		HIGHEST	CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITE Fai		HIGH PRESS E: FAILS TO (SURE HELIUM CLOSE (FAILS	TEST POI 5 OPEN),	RT COUPLINGS OR LEAKS	A & B
LEA	D ANALYS	r: subs	YS LEAD: D	J. PAUL		
1) 2) 3)	ASSEMBI HE PRES	E COMPONENTS	TEST PORT	COUPLING	S A & B	
			CRITICALI	TIES		
	FLIGHT P		/FUNC		HDW/FUN	2

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/1R
3/3		3/1R
3/2R		3/1R
•		3/1R
•		0 / 10
,		
	3/3 3/3 3/2R 3/1R	3/3 RTLS: 3/3 TAL: 3/2R AOA: 3/1R ATO:

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

LOCATION: OMS/RCS POD PART NUMBER: FU & OX: ME276-0032-0021,0019

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. FAILURE OF ALL REDUNDANCY WILL CAUSE LOSS OF HELIUM PRESSURIZATION. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 209			CRITICALITY FLIGHT: ABORT:	3/3 3/3
ITEM: HIGH PRESS FAILURE MODE: FAILS TO (SURE HELIUM OPEN (FAILS	TEST POR CLOSED)	T COUPLINGS	A & B
LEAD ANALYST: SUB	SYS LEAD: D	.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HIGH PRESSURE HELIUM 5) 6) 7) 8) 9)	1 TEST PORT	COUPLINGS	SA&B	
	CRITICAL	ITIES		
FLIGHT PHASE HD PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	W/FUNC 3/3 3/3 3/3 3/3 3/3	ABORT RTL: TAL AOA	HDW/FUI S: 3/3 : 3/3 : 3/3 : 3/3	NC
REDUNDANCY SCREENS: A	[]	в[]	с[]	
LOCATION: OMS/RCS PO PART NUMBER: FU & OX: M	D E276-0032-0	021,0019		
CAUSES: CONTAMINATION,	VIBRATION,	PIECE-PAR	T STRUCTURA	L FAILURE
EFFECTS/RATIONALE: NONE.				

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS		FLIGHT:	3/1R
MDAC ID:	210		ABORT:	3/1R

ITEM: HELIUM PRESSURE REGULATOR ASSEMBLY FAILURE MODE: FAILS OPEN OR REGULATES AT HIGHER THAN NORMAL PRESSURE

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

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

CRITICALITIES

CULTICN	TTITES	
HDW/FUNC	ABORT	HDW/FUNC
3/1R	RTLS:	3/1R
3/1R		3/1R
•		3/1R
•		3/1R
3/3	AIO.	3/ IR
	HDW/FUNC 3/1R 3/1R 3/1R 3/1R 3/1R	3/1R RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

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

LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0418-0012,0011

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE HELIUM ISOLATION VALVE AND THE SERIES PRESSURE REGULATOR. FAILURE OF ALL REDUNDANCY WILL CAUSE OVERPRESSURIZATION AND RUPTURE OF THE PROPELLANT TANK AND LINES, AND MAY CAUSE ZOTS.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

WINC CONTRACTORY NOW/FUNC

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 211	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: HELIUM PRESSURE FAILURE MODE: FAILS CLOSED	REGULATOR ASSEMBLY
LEAD ANALYST: SUBSYS LE	AD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HELIUM PRESSURE REGULATOR 5) 6) 7) 8) 9)	ASSEMBLY
CRI	TICALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1R AOA: 2/1R
REDUNDANCY SCREENS: A [2]	B[NA] C[P]
LOCATION: OMS/RCS POD	

PART NUMBER: FU & OX: MC284-0418-0012,0011

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

STANDBY REDUNDANCY. NEXT ASSOCIATED FAILURE (PARALLEL REGULATOR OR PARALLEL HELIUM ISOLATION VALVE) WILL CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY. LOSS OF HELIUM PRESSURIZATION WILL CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND THE CG SAFETY BOUNDARIES TO BE EXCEEDED DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

C-113

DATE: SUBSYSTEM: MDAC ID:	2/26/87 ARCS 212	HIGHEST	CRITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: FAILURE MODI	HELIUM PRESSURE REGU E: RESTRICTED FLOW	LATOR ASS	EMBLY	
LEAD ANALYS	SUBSYS LEAD: 1	D.J. PAUL		
2) ASSEMBI 3) HE PRES	E COMPONENTS	MBLY		

	CRITICA	LITIES	
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 [NA] C [P]

LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0418-0012,0011

CAUSES: BLOCKAGE OF INLET FILTER

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY PARALLEL REGULATOR. RESTRICTED FLOW THROUGH REGULATORS MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, WHICH MAY RESULT IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 213	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R			
ITEM: HELIUM PRESSURE F FAILURE MODE: LEAKS EXTERNALLY	REGULATOR ASSEMBLY			
LEAD ANALYST: SUBSYS LEAD	D: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HELIUM PRESSURE REGULATOR A 5) 6) 7) 8) 9)	SSEMBLY			
CRITICALITIES				
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1R AOA: 2/1R			
REDUNDANCY SCREENS: A [2]	B[P] C[P]			
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0418-0012,0011				
CAUSES: CONTAMINATION, VIBRATIO	ON, PIECE-PART STRUCTURAL FAILURE			

EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY PARALLEL REGULATOR AND MANUAL OPERATION OF THE HELIUM ISOLATION VALVE. FAILURE OF ALL REDUNDANCY WILL RESULT IN LOSS OF HELIUM PRESSURIZATION, CAUSING THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ENTRY OR ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 214	HIGHEST (CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: HELIUM P FAILURE MODE: LEAKS EXT	RESSURE REGULATOR PRID TERNALLY	MARY SENSING PORT
LEAD ANALYST: SU	BSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) HELIUM PRESSURE REC 5) 6) 7) 8) 9)		NG PORT
	CRITICALITIES	
FLIGHT PHASE HI PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3 RTL 3/3 TAL 3/2R AOA 2/1R ATO	2/1R 2/1R
REDUNDANCY SCREENS:	A [2] B [P]	C [P]

LOCATION: OMS/RCS FUEL/OXIDIZER CHECKOUT PANEL PART NUMBER: FU & OX: 73A620096-2001

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY MANUAL OPERATION OF THE HELIUM ISOLATION VALVE AND THE PARALLEL HELIUM PATH. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING CONSTRAINT AND CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT. THERE ARE NO VALVES OR CAPS IN THE SENSING PORT LINES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 215		_	CICALITY LIGHT: BORT:	HDW/FUNC 2/1R 2/1R
ITEM: HELIUN FAILURE MODE: FAILS	1 PRESSURE REG TO OPEN (FAIL	ULATOR PRIMAR S CLOSED)	Y SENSING	PORT
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) HE PRESS SUBSYST 4) HELIUM PRESSURE 5) 6) 7) 8) 9)	'EM	MARY SENSING	PORT	
	CRITICA	LITTES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFIN	HDW/FUNC 3/1R 3/1R 3/1R 2/1R	ABORT RTLS: TAL: AOA: ATO:	•	c
REDUNDANCY SCREENS:	A [2]	В[Р]	C[P]	

LOCATION: OMS/RCS FUEL/OXIDIZER CHECKOUT PANEL PART NUMBER: FU & OX: 73A620096-2001

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY PARALLEL HELIUM PATH, AND OTHER SERIES PRESSURE REGULATOR. NEXT ASSOCIATED FAILURE WILL CAUSE REGULATION AT A HIGHER PRESSURE WHICH MAY CAUSE AN UNACCEPTABLE MIXTURE RATIO AND/OR RUPTURE OF THE PROPELLANT TANKS AND LINES. ZOTS MAY CAUSE THRUSTER VALVE DAMAGE, LEADING TO PROPELLANT IGNITION WITHIN THE POD AND/OR THRUSTER NOZZLE BURNTHROUGH.

SUBS	E: System: C ID:			HIGHEST	CRITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
FAII	LING	E: FAILS	I PRESSURE REG TO CLOSE (FAI SUBSYS LEAD:	LS OPEN),		PRT
1) 2)	HARDWAH ASSEMBI HE PRES	SS SUBSYSTE		LET TEST I	PORT COUPLIN	G
			CRITICAL	LITIES		
	LIFTC ONORE DEORE	UNCH:)FF: SIT:	HDW/FUNC 3/3 3/3 3/2R 2/1R 3/3	ABORT RTI TAL AOA ATO	: 2/1R : 2/1R	

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

LOCATION: OMS/RCS FUEL/OXIDIZER TEST PORT PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR CAP) WILL BE UNDETECTABLE. NEXT ASSOCIATED FAILURE WILL CAUSE LOSS OF HELIUM PRESSURIZATION. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING CONSTRAINT AND CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 217	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
COUPLING FAILURE MODE: FAILS	I PRESSURE REGULATOR OUTLET TEST PORT TO OPEN (FAILS CLOSED) SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 2) DEC CURSYST	NTS
	CRITICALITIES
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 3/3 AOA: 3/3 3/3 ATO: 3/3 3/3 ATO: 3/3
REDUNDANCY SCREENS:	A[] B[] C[]

LOCATION: OMS/RCS FUEL/OXIDIZER TEST PORT PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:2/1RMDAC ID:218ABORT:2/1R
ITEM: QUAD CHECK VALVE ASSEMBLY FAILURE MODE: FAILS TO CLOSE (FAILS OPEN) OR LEAKS (REVERSE FLOW)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) QUAD CHECK VALVE ASSEMBLY 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:2/1RLIFTOFF:3/3TAL:2/1RONORBIT:3/2RAOA:2/1RDEORBIT:2/1RATO:2/1RLANDING/SAFING:3/1R3/2R
REDUNDANCY SCREENS: A [2] B [F] C [P]
LOCATION: OMS/RCS POD

PART NUMBER: FU & OX: MC284-0481-0002,0001

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

NEXT ASSOCIATED FAILURE (VALVE IN SERIES WITH FAILED VALVE FAILS OPEN) WILL ALLOW PROPELLANT TO BACKFLOW TO THE REGULATORS. THIS CAN CAUSE LOSS OF LIFE DURING GROUND SERVICING DUE TO INHALATION OF PROPELLANT VAPORS. CORROSION OF HELIUM REGULATORS AND/OR HELIUM ISOLATION VALVES BY PROPELLANT WHICH HAS BACKFLOWED MAY CAUSE LOSS OF HELIUM PRESSURIZATION CAPABILITY.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 219 ITEM: QUAD CHECK VAL FAILURE MODE: FAILS TO OPEN	HIGHEST CRITICALITY HDW/FUNG FLIGHT: 2/1R ABORT: 2/1R VE ASSEMBLY (FAILS CLOSED)	2
FAILURE MODE: FAILS TO OPEN	(TAILD CLOBED)	
LEAD ANALYST: SUBSYS 1	LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) QUAD CHECK VALVE ASSEMBL 5) 6) 7) 8) 9)	ΓÅ	
CR	RITICALITIES	
FLIGHT PHASE HDW/FUN	IC ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO: 2/1R	
PRELAUNCH: 3/3	RTLS: 2/1R	
I.TETOFF: 3/3	TAL: $2/1R$	
ONORBIT: 3/2R	AOA: $2/1R$	
DEORBIT: 2/1R	ATO: 2/1R	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [2] B[F] C[P]	
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-	-0481-0002,0001	
CAUSES: PIECE-PART STRUCTURA PROPELLANT INSIDE VALVE	AL FAILURE, LOW TEMPERATURE FREEZES	
EFFECTS/RATIONALE:	TTA WITH BATIC CLOCED WITH CAUSE	

NEXT ASSOCIATED FAILURE (PARALLEL VALVE FAILS CLOSED) WILL CAUSE LOSS OF HELIUM PRESSURIZATION. LOSS OF HELIUM PRESSURIZATION CAPABILITY WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND THE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 220	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
~	K VALVE TEST PORT C CLOSE (FAILS OPEN),	
LEAD ANALYST: SUBS	SYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) QUAD CHECK VALVE TES 5) 6) 7) 8) 9)	ST PORT COUPLINGS A	. & В
	CRITICALITIES	
PRELAUNCH:3LIFTOFF:3ONORBIT:3DEORBIT:3	/FUNC ABORT /3 RTI /3 TAI /2R AOA /1R ATC /3	LS: 3/1R L: 3/1R A: 3/1R
REDUNDANCY SCREENS: A [2] B[NA]	C [P]

LOCATION: OMS/RCS FUEL/OXIDIZER CHECKOUT PANEL PART NUMBER: FU & OX: ME276-0032-0007,0008

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. FAILURE OF ALL REDUNDANCY WILL CAUSE LOSS OF HELIUM UNTIL CREW CLOSES HELIUM ISOLATION VALVES. LOSS OF HELIUM PRESSURIZATION WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 221			ITICALITY FLIGHT: ABORT:	
ITEM: QUAD (FAILURE MODE: FAILS	CHECK VALVE TE: TO OPEN (FAILS	ST PORT COUP S CLOSED)	LINGS A &	В
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) HE PRESS SUBSYSTEM 4) QUAD CHECK VALVE TEST PORT COUPLINGS A & B 5) 6) 7) 8) 9)				
	CRITICAL	ITIES		
FLIGHT PHASE			HDW/FUN	C
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:		
ONORBIT:	3/3	AOA:		
DEORBIT:	3/3 3/3 3/3	ATO:		
LANDING/SAFING	: 3/3			
REDUNDANCY SCREENS:	A []	в[]	с[]	
LOCATION: OMS/RCS FUEL/OXIDIZER CHECKOUT PANEL PART NUMBER: FU & OX: ME276-0032-0007,0008				
CAUSES: CONTAMINATIO	N, VIBRATION,	PIECE-PART	STRUCTURAI	J FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).

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DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 222	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: PROPELLANT TANK FAILURE MODE: STRUCTURAL FAILURE (RUPTURE OR LEAK)
LEAD ANALYST: SUBSYS LEAD: I).J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROPELLANT TANK 5) 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 1/1 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1 LANDING/SAFING: 1/1	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1
REDUNDANCY SCREENS: A [] LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC282-0061-0	
CAUSES: MECHANICAL SHOCK, HIGH PRES	SSURE, VIBRATION
EFFECTS/RATIONALE: FAILURE RESULTS IN LOSS OF PROPELLAN OF PROPELLANT CAN CAUSE CORROSION, I	NT INTO THE POD/VEHICLE. LOSS LEADING TO ELECTRICAL SHORTS

OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 H SUBSYSTEM: ARCS MDAC ID: 223	IIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: PROP LINES, ALL FAILURE MODE: STRUCTURAL FAILURE (R)	JPTURE OR LEAK)
LEAD ANALYST: SUBSYS LEAD: D.3	J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP LINES, ALL 5) 6) 7) 8) 9)	
CRITICALI	ries
FLIGHT PHASE HDW/FUNC PRELAUNCH: 1/1 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1	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: ANY LINE BETWEEN PROPE PART NUMBER: FU & OX:	LLANT TANK AND THRUSTERS.
CAUSES: VIBRATION, MECHANICAL SHOCK	, HIGH PRESSURE
EFFECTS/RATIONALE: PRESSURE IN TANK AND LINE WILL FORCE	PROPELLANT OUT OF LINE INTO

POD/VEHICLE. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 224	HIGHES	T CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: PROP LIN FAILURE MODE: RESTRICT		
LEAD ANALYST: S	UBSYS LEAD: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) PROP STOR & DIST S 4) PROP LINES, ALL 5) 6) 7) 8) 9)		
	CRITICALITIES	
FLIGHT PHASE H PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3 R' 1/1 T. 1/1 A 1/1 A'	F HDW/FUNC FLS: 1/1 AL: 1/1 DA: 1/1 FO: 1/1
REDUNDANCY SCREENS:	A[] B[]	c []
LOCATION: ANY LINE PART NUMBER: FU & OX:	BETWEEN PROPELLANT	TANK AND THRUSTERS.

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, CAUSING ZOTS AND/OR NOZZLE BURNTHROUGH RESULTING IN LOSS OF VEHICLE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 225	,	HIGHEST	CRITICALITY FLIGHT: ABORT:	2/1R
ITEM: PROP F FAILURE MODE: FAILS	ILL/VENT COUPL TO CLOSE (FAIL	ING S OPEN),	OR LEAKS EXT	ERNALLY
LEAD ANALYST:	SUBSYS LEAD: I	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP FILL/VENT (5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC 2/1R 2/1R 2/1R 2/1R 2/1R	ABORT RTI TAI AOF	HDW/FUN LS: 2/1R L: 2/1R A: 2/1R D: 2/1R	IC
REDUNDANCY SCREENS:	A [2]	B [NA]	С[Р]	
LOCATION: OMS/RCS	5 FUEL SERVICIN	G PANEL		

PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF CREW FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 226			TICALITY LIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: PROP F FAILURE MODE: FAILS	ILL/VENT COUPL TO OPEN (FAILS			
LEAD ANALYST:	SUBSYS LEAD: D	.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE: 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP FILL/VENT Co 5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	TIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 3/3 3/3		HDW/FUNC 3/3 3/3 3/3 3/3	
REDUNDANCY SCREENS:	A[] B	[]	с[]	

LOCATION: OMS/RCS FUEL SERVICING PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1 2/26/87 DATE: SUBSYSTEM: ARCS MDAC ID: 227 PROP CHANNEL SCREENS ITEM: FAILURE MODE: STRUCTURAL FAILURE (RUPTURE) LEAD ANALYST: SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP CHANNEL SCREENS 5) 6) 7) 8) 9) CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1 CRITICALITIES LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: PROPELLANT TANK INTERIOR PART NUMBER: FU & OX: CAUSES: HIGH PRESSURE, VIBRATION, PIECE-PART STRUCTURAL FAILURE EFFECTS/RATIONALE: HELIUM INGESTION WILL CAUSE ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH. FAILURE IS NOT DETECTABLE UNTIL THRUSTERS FAIL DUE TO HELIUM INGESTION OR ZOTS. REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); RCS 2102, FIG. 3.2.

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DATE: 2/26/8 SUBSYSTEM: ARCS MDAC ID: 228	7	HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 1/1
ITEM: PROP FAILURE MODE: RESTR	FEEDOUT TUBE ICTED FLOW			
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP FEEDOUT TUE 5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH:	HDW/FUNC	ABORT	HDW/FUNC	
LIFTOFF:	3/3 1/1 1/1 1/1	RTLS:	-, -	
ONORBIT:	1/1	TAL:	-, -	
ONORBIT: DEORBIT:	1/1	AOA:		
LANDING/SAFING	: 3/3	ATO:	1/1	
REDUNDANCY SCREENS:	λ Γ 3			
		В[]	с[]	
LOCATION: PROPELLA PART NUMBER: FU & OX	ANT TANK INTER	IOR		
CAUSES: CONTAMINATION	, PIECE-PART S	STRUCTURAL F	AILURE, VAC	UUM
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNAC RESULTING IN ZOTS AND/ VEHICLE.				

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 J, K AND 6-95.

DATE:2/26/87HIGHEST CRITICALITSUBSYSTEM:ARCSFLIGHT:MDAC ID:229ABORT:	3/1R
ITEM: PROP TK UPPER COMPARTMENT CHANNEL CHECK COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS E	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK UPPER COMPARTMENT CHANNEL CHECKOUT COUPLI 5) 6) 7) 8) 9)	ŊĠ
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FPRELAUNCH:3/1RRTLS:3/1LIFTOFF:3/1RTAL:3/1ONORBIT:3/1RAOA:3/1DEORBIT:3/1RATO:3/1LANDING/SAFING:3/1RATO:3/1	R R R
REDUNDANCY SCREENS: A [2] B [NA] C [P]

LOCATION: OMS/RCS POD PART NUMBER: FU & OX: ME276-0032-0007,0005

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. FAILURE OF ALL REDUNDANCY WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 J, K AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 230	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: PROP TK UPPER COMPART COUPLING FAILURE MODE: FAILS TO OPEN (FAILS	
LEAD ANALYST: SUBSYS LEAD: D.	.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK UPPER COMPARTMENT CHANN 5) 6) 7) 8) 9)	VEL CHECKOUT COUPLING
CRITICALI	TTT
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	3[] C[]
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: ME276-0032-00	007,0005

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE:	2/26/87	HIGHEST CRITICALITY	
SUBSYSTEM:		FLIGHT:	2/1R
MDAC ID:	231	ABORT:	2/1R

ITEM: PROP TK LOWER COMPARTMENT CHANNEL BLEED COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS EXTERNALLY

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

1) HARDWARE COMPONENTS

2) ASSEMBLIES

3) PROP STOR & DIST SUBSYSTEM

- 4) PROP TK LOWER COMPARTMENT CHANNEL BLEED COUPLING
- 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: NOT SPECIFIED ON DRAWING PART NUMBER: FU & OX: MC276-0018-3451,3401

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 J, K AND 6-95.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:3/3MDAC ID:232ABORT:3/3
ITEM: PROP TK LOWER COMPARTMENT CHANNEL BLEED COUPLING FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK LOWER COMPARTMENT CHANNEL BLEED COUPLING 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: NOT SPECIFIED ON DRAWING PART NUMBER: FU & OX: MC276-0018-3451,3401

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 233		CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: PROP TK FAILURE MODE: FAILS T	LOWER COMPARTMENT CHI O CLOSE (FAILS OPEN),	ECKOUT COUPLING OR LEAKS EXTERNALLY
LEAD ANALYST: S	UBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK LOWER COM 5) 6) 7) 8) 9)		PLING
	CRITICALITIES	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC ABORT 3/1R RT 3/1R TA 3/1R AC 3/1R AT	LS: 3/1R L: 3/1R
REDUNDANCY SCREENS:	A [2] B [NA]	С[Р]

LOCATION: OMS/RCS POD PART NUMBER: FU & OX: ME276-0032-0007,0005

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. FAILURE OF ALL REDUNDANCY WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 J, K AND 6-95.

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DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 234	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: PROP TK LOWER COMPA FAILURE MODE: FAILS TO OPEN (FAII	RTMENT CHECKOUT COUPLING LS CLOSED)
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK LOWER COMPARTMENT CHE 5) 6) 7) 8) 9)	CKOUT COUPLING
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: ME276-0032-0	0007,0005

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 235	7		TICALITY LIGHT: BORT:	
ITEM: PROP ' FAILURE MODE: FAILS	IK PLENUM SCREEN TO CLOSE (FAILS	CHECKOUT C OPEN), OR	OUPLING LEAKS EXT	ERNALLY
LEAD ANALYST:	SUBSYS LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TK PLENUM S 5) 6) 7) 8) 9)	SUBSYSTEM	COUPLING		
	CRITICALI			•
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	3/1R 3/1R 3/1R 3/1R 3/1R	ABORT RTLS: TAL: AOA: ATO:	3/1R 3/1R	u i

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

LOCATION: NOT SPECIFIED ON DRAWING PART NUMBER: FU & OX: ME276-0032-0007,0005

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. FAILURE OF ALL REDUNDANCY WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 J, K AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 236	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3				
ITEM: PROP TK PLENUM SCREEN CHECKOUT COUPLING FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)					
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL					
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK PLENUM SCREEN CHECKOUT COUPLING 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: NOT SPECIFIED ON DRAWING PART NUMBER: FU & OX: ME276-0032-0007,0005					

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS		FLIGHT:	2/1R
MDAC ID:	237		ABORT:	2/1R

PROP TK ENTRY SUMP BLEED COUPLING ITEM: FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS EXTERNALLY

SUBSYS LEAD: D.J. PAUL LEAD ANALYST:

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- PROP TK ENTRY SUMP BLEED COUPLING 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

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

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

LOCATION: OMS/RCS FUEL SERVICING PANEL PART NUMBER: FU & OX: MC276-0018-3452,3402

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 J, K AND 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 238	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3			
ITEM: PROP TK ENTRY SUMP BLEED COUPLING FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)				
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TK ENTRY SUMP BLEED COUPLING 5) 6) 7) 8) 9)				
CRITICALITIES				
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3			
REDUNDANCY SCREENS: A [] LOCATION: OMS/RCS FUEL SERVIC:	B[] C[] ING PANEL			

PART NUMBER: FU & OX: MC276-0018-3452,3402

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 239	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1			
ITEM: GIMBAL BELLOWS FAILURE MODE: STRUCTURAL FAILURE	(RUPTURE OR LEAK)			
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GIMBAL BELLOWS 5) 6) 7) 8) 9)				
CRITICA	LITIES			
FLIGHT PHASEHDW/FUNCPRELAUNCH:1/1LIFTOFF:1/1ONORBIT:1/1DEORBIT:1/1LANDING/SAFING:1/1				
REDUNDANCY SCREENS: A []	B[] C[]			
LOCATION: DOWNSTREAM OF PROPELLANT TANK PART NUMBER: FU & OX: 73P550015-1006				
CAUSES: HIGH PRESSURE, VIBRATION,	PIECE-PART STRUCTURAL FAILURE			
EFFECTS/RATIONALE: ASSUME THIS IS A SINGLE BARRIER FAILURE, THAT IS, NO INTERNAL LEAK PATH REDUNDANCY EXISTS. FAILURE RESULTS IN PROPELLANT LEAKING INTO THE POD/VEHICLE. LOSS OF PROPELLANT CAN CAUSE				

LEAKING INTO THE POD/VEHICLE. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).

DATE: 2/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: ARCS FLIGHT: 1/1 MDAC ID: 240 HIGHEST CRITICALITY HDW/FUNC HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1 ABORT: 1/1				
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GIMBAL BELLOWS 5) 6) 7) 8) 9)				
CRITICALITIES				
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:3/33/31/1				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: DOWNSTREAM OF PROPELLANT TANK PART NUMBER: FU & OX: 73P550015-1006				
CAUSES: VACUUM, CONTAMINATION, PIECE-PART STRUCTURAL FAILURE				
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE				

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 J, K AND 6-95.

VEHICLE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 241	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: PRESSURE RELIEF ASS FAILURE MODE: BURST DISK RUPTURES	EMBLY AT LOW PRESSURE, OR LEAKS
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PRESSURE RELIEF ASSEMBLY 5) 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE 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[F] C[P]
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0421-	0012,0011

CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (BURST DISC RUPTURE) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF CREW FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS		FLIGHT:	1/1
MDAC ID:	242		ABORT:	1/1

ITEM: PRESSURE RELIEF ASSEMBLY FAILURE MODE: BURST DISK FAILS TO RUPTURE, RUPTURES AT A HIGHER THAN NOMINAL PRESSURE, OR POPPET VALVE FAILS CLOSED AFTER BURST DISK RUPTURES AT NOMINAL PRESSURE.

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

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

	CRITICA		
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: OMS/RCS POD PART NUMBER: FU & OX: MC284-0421-0012,0011

CAUSES: MATERIAL FLAW, CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

OVERPRESSURIZATION OF PROPELLANT TANK AND LINES WILL CAUSE TANK AND/OR LINE RUPTURE. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND/OR PROPELLANT IGNITION.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 243	HIC	HEST CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM: RELIEF FAILURE MODE: PRESSU (FAILS OPEN) OR LEAKS	VALVE TEST PORT (JRE RELIEF VALVE T OVERBOARD	COUPLING EST PORT FAILS TO	CLOSE
LEAD ANALYST:	SUBSYS LEAD: D.J.	PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) RELIEF VALVE TES 5) 6) 7) 8) 9)	SUBSYSTEM		
	CRITICALITI		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	3/1R 3/1R 3/1R 3/1R 3/1R	ABORT HDW/FU RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R	
REDUNDANCY SCREENS:	A[2] B[NA] C[P]	

LOCATION: OMS/RCS FUEL/OXIDIZER CHECKOUT PANEL PART NUMBER: FU & OX: ME276-0032

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (BURST DISC RUPTURE) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING DEORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF CREW FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS		FLIGHT:	3/3
MDAC ID:	244		ABORT:	3/3

ITEM: RELIEF VALVE TEST PORT COUPLING FAILURE MODE: PRESSURE RELIEF VALVE TEST PORT FAILS TO OPEN (FAILS CLOSED)

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) RELIEF VALVE TEST PORT COUPLING
- 5)
- 6)
- 7)
- 8)
- 9)

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

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

LOCATION: OMS/RCS FUEL/OXIDIZER CHECKOUT PANEL PART NUMBER: FU & OX: ME276-0032

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).

DATE:2/26/87HIGHEST CRITICALITYHDW/FSUBSYSTEM:ARCSFLIGHT:3/3MDAC ID:245ABORT:3/3	ł		
ITEM: GROUND MANUAL ISOLATION VALVE FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALI	Y		
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GROUND MANUAL ISOLATION VALVE 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3			
REDUNDANCY SCREENS: A [] B [] C []			
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0480-0002,0001			
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAIL MECHANICAL SHOCK (GROUND HANDLING)	JURE,		

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 246		CICALITY HDW/FUNC LIGHT: 1/1 FORT: 1/1		
ITEM: GROUND MANUAL ISOLATI FAILURE MODE: FAILS TO REMAIN OPEN	ON VALVE (FAILS CLOSE	D)		
LEAD ANALYST: SUBSYS LEAD: D	J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GROUND MANUAL ISOLATION VALVE 5) 6) 7) 8) 9)				
CRITICALI	TIES			
FLIGHT PHASE HDW/FUNC	ABORT	HDW/FUNC		
PRELAUNCH: 3/3	RTLS:	1/1		
LIFTOFF: 3/3	TAL:	1/1		
ONORBIT: 2/2	AOA:	1/1		
DEORBIT: 1/1	ATO:	1/1		
LANDING/SAFING: 3/3		÷/ ÷		
REDUNDANCY SCREENS: A [] B	[] c	: ۲)		
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0480-0002,0001				
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK (GROUND HANDLING)				

EFFECTS/RATIONALE:

FAILURE RESULTS IN LOSS OF HELIUM PRESSURIZATION (VALVE LOCATED UPSTREAM OF PROPELLANT TANK). LOSS OF HELIUM PRESSURIZATION WILL CAUSE THE TANK LANDING WEIGHT CONSTRAINTS AND CG SAFETY BOUNDARIES TO BE EXCEEDED DUE TO THE TRAPPED PROPELLANT'S WEIGHT.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA); FLIGHT RULE 6-41 G, H, I AND 6-95.

DATE: SUBSYS MDAC I	STEM:		,	HIGHEST	CRITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 1/1
ITEM: FAILUR	RE MODI	GROUNE E: LEAKS) MANUAL ISOLAT EXTERNALLY	ION VALVI	3	
LEAD A	ANALYS	r:	SUBSYS LEAD:	D.J. PAUL		
1) H 2) A 3) P	BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) GROUND MANUAL ISOLATION VALVE 5) 6) 7) 8)					
			CRITICA	LITIES		
FI	PRELI LIFT ONORI DEORI	PHASE AUNCH: OFF: BIT: BIT: ING/SAFINC	HDW/FUNC 1/1 1/1 1/1 1/1	ABORT RT: TA: AO	HDW/FUN LS: 1/1 L: 1/1 A: 1/1 0: 1/1	IC
REDUNI	DANCY	SCREENS:	A []	в[]	C []	
LOCATI PART 1	ION: NUMBER	OMS/RCS : FU & O	S POD X: MC284-0480-	0002,0001		
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, MECHANICAL SHOCK (GROUND HANDLING)						
EFFECTS/RATIONALE: FAILURE RESULTS IN LOSS OF PROPELLANT AND HELIUM. PROPELLANT WILL LEAK INTO THE POD. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.						
REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DA).						

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DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 248	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1			
ITEM: PROP TANK ISOL VLVS FAILURE MODE: LEAKS EXTERNALLY	: 1/2 & 3/4/5			
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TANK ISOL VLVS 1/2 & 3/4/5 5) 6) 7) 8) 9)				
CRITICA	LITIES			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 1/1 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1	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 []	в[] с[]			
LOCATION: OMS/RCS POD PART NUMBER: FU & OX:				
CAUSES: VIBRATION, PIECE-PART STRUCTURAL FAILURE				
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LEAKING INTO THE POD/VEHICLE, CAUSING CORROSION, WHICH COULD RESULT IN ELECTRICAL SHORTS AND PROPELLANT IGNITION.				

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DC).

DATE: 2/26/8 SUBSYSTEM: ARCS MDAC ID: 249	7	HIGHEST CH	RITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 1/1
ITEM: PROP ' FAILURE MODE: RESTR	TANK ISOL VLVS : ICTED FLOW	L/2 & 3/4/9	5	
LEAD ANALYST:	SUBSYS LEAD: D	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPON 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TANK ISOL V 5) 6) 7) 8) 9)	ENTS	5		
	CRITICALI	TIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUN	C
PRELAUNCH:	3/3	RTLS:	: 1/1	
LIFTOFF:	1/1	TAL:	1/1	
ONORBIT:	1/1	AOA:	1/1	
DEORBIT:	1/1	ATO:	1/1	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	G: 3/3			
REDUNDANCY SCREENS:	A [] E	3[]	c[]	
LOCATION: OMS/RCS	5 POD			
PART NUMBER: FU & O	X:			
CAUSES: VIBRATION,	PIECE-PART STRUC	TURAL FAII	LURE	
EFFECTS/RATIONALE: FAILURE MAY CAUSE UN	ACCEPTABLE PROPI	ELLANT MIX	TURE RATIO,	

RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DC).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 250		F	TICALITY HDW/FUNC LIGHT: 3/2R BORT: 1/1	
ITEM: PROP TA FAILURE MODE: FAILS	ANK ISOL VLV 1/ TO CLOSE (FAILS	2 5 OPEN), OR 1	LEAKS INTERNALLY	
LEAD ANALYST:	SUBSYS LEAD: D	.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) PROP TANK ISOL VI 5) 6) 7) 8) 9)	SUBSYSTEM	,		
	CRITICALI	TIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 3/2R 3/2R 3/2R		1/1 2/1R 2/1R	
REDUNDANCY SCREENS:	A [2]	В[Р]	С[Р]	
	POD			

LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0012,0011

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

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REDUNDANCY PROVIDED BY THE 3/4/5 A & B ISOLATION VALVES. FAILURE WILL AFFECT CROSSFEED OPERATIONS AND ENTRY DTOS AND PTIS. FAILURE OF ALL REDUNDANCY MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ENTRY OR ABORTS TO MEET THE TANK LANDING CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DC).

	OKDITER DOD.				
DATE: SUBSYSTEM: MDAC ID:	2/26/87 ARCS 251		HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 1/1
FAILURE MOD	E: FAILS TO	K ISOL VLV 1, OOPEN (FAILS	CLOSED)		
LEAD ANALYS	T: SU	BSYS LEAD: D	J. PAUL		
2) ASSEMB	RE COMPONENT	UBSYSTEM			
		CRITICAL	ITIES		
FLIGHT PREL LIFT ONOR DEOR LAND	PHASE H AUNCH: OFF: BIT: BIT: DING/SAFING:	IDW/FUNC 3/3 3/3 3/2R 2/1R	ABORT RTLS TAL: AOA: ATO:	HDW/FUN 5: 1/1 2/1R 2/1R 2/1R 2/1R	ĩC
REDUNDANCY	SCREENS:	A [2]	B[P]	С[Р]	
LOCATION: PART NUMBER	OMS/RCS I R: FU & OX:	POD MC284-0430-0	0012,0011		
CAUSES: CO LOSS OF SIG	NTAMINATION	, VIBRATION,	PIECE-PAR	T STRUCTURA	L FAILURE,
A & B ISOLA PRIMARY JES ENTRY DTOS PROPELLANT	DURING ALL 3 ATION VALVES IS WHICH WIL AND PTIS, AN DURING RTLS 5, AND/OR TH FAILURE MAY	PHASES EXCEPT . FIRST FAIL L AFFECT ONON ND MAY CAUSE TO MEET THE E CG SAFETY N RESULT IN LA	LURE WILL C RBIT CROSS THE INABI TANK LAND	FEED OPERAT LITY TO EXP ING WEIGHT SIMILARL	IONS, EL ENOUGH Y, NEXT
REFERENCES: VS70-943099	: JSC 11174 9 REV B EO B	, SPACE SHUT 312 (43DC); F	TLE SYSTEM LIGHT RULE	IS HANDBOOK, 6-95.	11.5;

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 252	HI	GHEST CRITICALITY HDW/FUNC FLIGHT: 2/2 ABORT: 1/1		
ITEM: PROP TAN FAILURE MODE: FAILS TO	K ISOL VLV 3/4/ CLOSE (FAILS O	5/ A & B PEN), OR LEAKS INTERNALLY		
LEAD ANALYST: SU	BSYS LEAD: D.J.	PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT: 2) ASSEMBLIES 3) PROP STOR & DIST SU 4) PROP TANK ISOL VLV 5) 6) 7) 8) 9)	JBSYSTEM			
FLIGHT PHASE HI PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	CRITICALITIE DW/FUNC A	BORT HOW/FILMO		
PRELAUNCH:	3/3	RTLS: 1/1		
LIFTOFF:	3/3	TAL: $2/1R$		
ONORBIT:	2/2	AOA: $2/1R$		
DEORBIT:	3/3	ATO: 2/1R		
LANDING/SAFING:	3/3	·		
REDUNDANCY SCREENS: A				
LOCATION: OMS/RCS PC PART NUMBER: FU & OX: M)D 1C284-0430-0012,	0011		
CAUSES: CONTAMINATION, LOSS OF SIGNAL FROM MDM	VIBRATION, PIEC	E-PART STRUCTURAL FAILURE,		
EFFECTS/RATIONALE: FAILURE OF THE PARALLEL 3/4/5 VALVE WILL AFFECT CROSSFEED				
OPERATIONS, AND MAY CAUS	E THE INABILITY	TO EXPEL ENOUGH		
PROPELLANTS DURING ABORT	S TO MEET THE T	ANK LANDING WEIGHT		
CONSTRAINTS AND/OR THE C	G SAFETY BOUNDA	RIES.		
REFERENCES: JSC 11174,	SPACE SHUTTLE S	STEMS HANDBOOK. 11.5:		
VS70-943099 REV B EO B12	2 (43DB).	maibbook, 11.3,		

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 253	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/lR ABORT: 2/lR			
ITEM: PROP TANK ISOL W FAILURE MODE: FAILS TO OPEN (F	LV 3/4/5/ A & B MAILS CLOSED)			
LEAD ANALYST: SUBSYS LEA	AD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) PROP TANK ISOL VLV 3/4/5/ 5) 6) 7) 8) 9)	A & B			
CRIJ	ICALITIES			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1R AOA: 2/1R			
REDUNDANCY SCREENS: A [2]	B[NA] C[P]			
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0012,0011				
CAUSES: CONTAMINATION, VIBRAT	ION, PIECE-PART STRUCTURAL FAILURE,			

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE PARALLEL 3/4/5 ISOLATION VALVE AND THE 1/2 ISOLATION VALVE. FAILURE OF BOTH VALVES ONORBIT WILL AFFECT CROSSFEED OPERATIONS AND ENTRY DTOS AND PTIS. FAILURE OF ALL REDUNDANCY WILL CAUSE LOSS OF SIX PRIMARY JETS WHICH MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANT DURING RTLS TO MEET THE CG SAFETY BOUNDARIES. SIMILARLY, FAILURE OF ALL REDUNDANCY MAY RESULT IN LOSS OF VEHICLE DURING ENTRY AND OTHER ABORTS.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DB); FLIGHT RULE 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 254	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
	DLD 1/2 GROUND PURGE COU TO CLOSE (FAILS OPEN),	
LEAD ANALYST:	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) MANIFOLD 1/2 GRO 5) 6) 7) 8) 9)		
	CRITICALITIES	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNCABORT2/1RRTI2/1RTAI2/1RAOA2/1RATO	HDW/FUNC LS: 2/1R L: 2/1R A: 2/1R D: 2/1R
REDUNDANCY SCREENS:	A [2] B [NA]	С[Р]

LOCATION: OMS/RCS FUEL/OXIDIZER DRAIN PURGE PANEL PART NUMBER: FU & OX: MC276-0018-3852,3802

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DD).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 255			ITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: MANIFO FAILURE MODE: FAILS	LD 1/2 GROUND TO OPEN (FAILS	PURGE COUPL CLOSED)	ING	
LEAD ANALYST:	SUBSYS LEAD: 1	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) MANIFOLD 1/2 GRO 5) 6) 7) 8) 9)	SUBSYSTEM	PLING		
	CRITICAL	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	3/3 3/3 3/3	TALL	3/3	IC
REDUNDANCY SCREENS:	A []	В[]	с[]	
LOCATION: OMS/RCS PART NUMBER: FU & OX	5 FUEL/OXIDIZEN K: MC276-0018-	R DRAIN PURG 3852,3802	E PANEL	
CAUSES: CONTAMINATIO	ON, VIBRATION,	PIECE-PART	STRUCTURAL	L FAILURE

EFFECTS/RATIONALE:

NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DD).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 256	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: MANIFOLD 3/4/5 GM FAILURE MODE: FAILS TO CLOSE (H	ROUND PURGE COUPLING FAILS OPEN), OR LEAKS EXTERNALLY
LEAD ANALYST: SUBSYS LEAD	D: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3/4/5 GROUND PURGE 5) 6) 7) 8) 9)	COUPLING
CRITI	CALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 2/1R LIFTOFF: 2/1R ONORBIT: 2/1R DEORBIT: 2/1R LANDING/SAFING: 2/1R	ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1B
REDUNDANCY SCREENS: A [2]	B[NA] C[P]
LOCATION: OMS/RCS FUEL/OXIDI PART NUMBER: FU & OX: MC276-001	ZER DRAIN PURGE PANEL 8-3852,3802

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE POSSIBLE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DC).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 257			RITICALITY FLIGHT: ABORT:	3/3
ITEM: MANIFOI FAILURE MODE: FAILS T	TO OPEN (FAILS	CLOSED)		
LEAD ANALYST: S	SUBSYS LEAD: D	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONEN 2) ASSEMBLIES 3) PROP STOR & DIST 4) MANIFOLD 3/4/5 GR 5) 6) 7) 8) 9)	SUBSYSTEM	UPLING		
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3 3/3	ABORT RTLS TAL: AOA: ATO:	3/3	IC .
REDUNDANCY SCREENS:	A []	в[]	c[]	
LOCATION: OMS/RCS PART NUMBER: FU & OX:	FUEL/OXIDIZER MC276-0018-3	DRAIN PUR 852,3802	GE PANEL	
CAUSES: CONTAMINATION	N, VIBRATION,	PIECE-PARI	STRUCTURAL	FAILURE

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DD).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 258	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1		
ITEM: RCS CROSSE FAILURE MODE: RESTRICTED	'EED VLV 1/2 OR 3/4/) FLOW	′5		
LEAD ANALYST: SUB	SYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) RCS CROSSFEED VLV 1/2 OR 3/4/5 5) 6) 7) 8) 9)				
	CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:3/3TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:3/31/1				
REDUNDANCY SCREENS: A [] B[]	c []		
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC				

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE:

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

DATE: 2/26/87 HIG SUBSYSTEM: ARCS MDAC ID: 259	HEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: RCS CROSSFEED VLV 1/2 OR FAILURE MODE: LEAKS EXTERNALLY	2 3/4/5
LEAD ANALYST: SUBSYS LEAD: D.J.	PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) RCS CROSSFEED VLV 1/2 OR 3/4/5 5) 6) 7) 8) 9)	
CRITICALITIE	25
FLIGHT PHASE HDW/FUNC A PRELAUNCH: 1/1 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1 LANDING/SAFING: 1/1	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0012,	.0011
CAUSES: CONTAMINATION, VIBRATION, PIECLOSS OF SIGNAL FROM MDM	CE-PART STRUCTURAL FAILURE,
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LEAKING I CAUSING CORROSION, WHICH COULD RESULT I PROPELLANT IGNITION.	NTO THE POD/VEHICLE, IN ELECTRICAL SHORTS AND
REFERENCES: JSC 11174, SPACE SHUTTLE S VS70-943099 REV B EO B12 (43CD & 43DD)	SYSTEMS HANDBOOK, 11.5; ; RCS 2102, FIG. 7-2 AND 8-

1. FLIGHT RULE 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 260	н	IGHEST CRITICA FLIGH ABORT	LITY HDW/FUNC F: 2/2 : 3/3
ITEM: RCS CROS FAILURE MODE: FAILS TO	SSFEED VLV 1/2 D CLOSE (FAILS	OPEN), OR LEAKS	S INTERNALLY
LEAD ANALYST: SU	UBSYS LEAD: D.J	. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) PROP STOR & DIST S 4) RCS CROSSFEED VLV 5) 6) 7) 8) 9)	UBSYSTEM		
	CRITICALIT	TES	
FLIGHT PHASE H	IDW/FUNC	ABORT HDV	/FUNC
PRELAUNCH:	3/3	RTLS: 3	3/3
LIFTOFF:	3/3	TAL: 3	3/3
ONORBIT:	2/2	AOA: 3	3/3
DEORBIT:	3/3	ATO: 3	3/3
FLIGHT PHASE H PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3		
REDUNDANCY SCREENS: A	с ј в	[]] c [3
LOCATION: OMS/RCS P PART NUMBER: FU & OX:	OD MC284-0430-001	2,0011	
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM			
EFFECTS/RATIONALE: DURING ONORBIT, THIS MA	AY AFFECT CROSS	FEED OPERATIONS	5.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 261		HIGHEST (CRITICALITY FLIGHT: ABORT:	
ITEM: RCS CR FAILURE MODE: FAILS	OSSFEED VLV 1/ TO OPEN (FAILS	2 CLOSED)		
LEAD ANALYST:	SUBSYS LEAD: I	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) PROP STOR & DIST 4) RCS CROSSFEED VL 5) 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	ITIES		_
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	HDW/FUNC	ABORT	HDW/FUN	С
PRELAUNCH:	3/3	RTL	S: 1/1	
LIFTOFF:	3/3	TAL	2/1R	
ONORBIT:	2/2	AOA	2/1R	
DEORBIT:	3/3	ATO	2/1R	
LANDING/SAFING	: 3/3			
REDUNDANCY SCREENS:	A []	в[]	с[]	
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0012,0011				
CAUSES: CONTAMINATIC LOSS OF SIGNAL FROM M	N, VIBRATION, DM	PIECE-PAR	T STRUCTURAL	FAILURE,

EFFECTS/RATIONALE:

FAILURE WILL AFFECT CROSSFEED OPERATIONS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT DURING ABORTS TO MEET THE TANK LANDING CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES. THERE IS NO REDUNDANCY TO CROSSFEED TO THE 1/2 THRUSTERS ONORBIT, AND NO REDUNDANCY DURING RTLS BECAUSE OF THE FIXED RCS AND OMS DUMP LENGTHS.

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS		FLIGHT:	2/2
MDAC ID:	262		ABORT:	3/3

ITEM: RCS CROSSFEED VLV 3/4/5 FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) PROP STOR & DIST SUBSYSTEM
- 4) RCS CROSSFEED VLV 3/4/5
- 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: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0012,0011

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM

EFFECTS/RATIONALE: DURING ONORBIT, THIS MAY AFFECT CROSSFEED OPERATIONS.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 263	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/2 ABORT: 1/1		
ITEM: RCS CROSSFEED VLV 3/ FAILURE MODE: FAILS TO OPEN (FAILS	'4/5 3 CLOSED)		
LEAD ANALYST: SUBSYS LEAD: I	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) RCS CROSSFEED VLV 3/4/5 5) 6) 7) 8) 9)			
CRITICAI	LITIES		
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R		
PRELAUNCH: 3/3	RTLS: 1/1		
LIFTOFF: 3/3	TAL: 2/1R		
ONORBIT: 2/2	AOA: $2/1R$		
ONORBIT: 2/2 DEORBIT: 3/3	ATO: 2/1R		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A []	в[] С[]		
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0012,0011			
CAUSES: CONTAMINATION, VIBRATION, LOSS OF SIGNAL FROM MDM	PIECE-PART STRUCTURAL FAILURE,		

EFFECTS/RATIONALE:

FAILURE WILL AFFECT CROSSFEED OPERATIONS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANT DURING ABORTS TO MEET THE TANK LANDING CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES. THERE IS NO REDUNDANCY TO CROSSFEED TO THE 3/4/5 THRUSTERS ONORBIT, AND NO REDUNDANCY DURING RTLS BECAUSE OF THE FIXED RCS AND OMS DUMP LENGTHS.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 264	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: CROSSFEED LINES FAILURE MODE: RESTRICTED FLOW	
LEAD ANALYST: SUBSYS LEAD	D: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) CROSSFEED LINES 5) 6) 7) 8) 9)	
CRITI	CALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 1/1 DEORBIT: 1/1 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1
REDUNDANCY SCREENS: A []	B[] C[]

LOCATION: ANY LINE BETWEEN PROPELLANT TANK AND THRUSTERS. PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, CAUSING ZOTS AND/OR NOZZLE BURNTHROUGH, RESULTING IN LOSS OF VEHICLE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43CD & 43DD).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 265	HIGHEST C	RITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: CROSSFEE FAILURE MODE: STRUCTUR	D LINES AL FAILURE (RUPTURE OR	LEAK)
LEAD ANALYST: SU	BSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT: 2) ASSEMBLIES 3) PROP STOR & DIST SU 4) CROSSFEED LINES 5) 6) 7) 8) 9)		
	CRITICALITIES	
PRELAUNCH: LIFTOFF: ONORBIT:	IDW/FUNC ABORT 1/1 RTLS 1/1 TAL: 1/1 AOA: 1/1 ATO:	1/1 1/1
REDUNDANCY SCREENS: A	.[] B[]	c []
		IN AND THRUSTERS.

LOCATION: ANY LINE BETWEEN PROPELLANT TANK AND THRUSTERS. PART NUMBER: FU & OX:

CAUSES: VIBRATION, MECHANICAL SHOCK, HIGH PRESSURE

EFFECTS/RATIONALE:

PRESSURE IN TANK AND LINE WILL FORCE PROPELLANT OUT OF LINE INTO POD/VEHICLE. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43CA & 43DA; 43CH & 43DH).

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:3/3MDAC ID:266ABORT:3/3		
ITEM: MANIFOLD 1, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY		
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, ISOL VLV 5) 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A		
REDUNDANCY SCREENS: A [] B [] C []		
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0006,0005		
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM		

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DE).

DATE: SUBSYSTEM: MDAC ID:	2/26/87 ARCS 267	HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 1/1
FAILURE MODE	MANIFOLD 1, ISOL VLV E: FAILS TO OPEN (FAILS	CLOSED)		
LEAD ANALYST	SUBSYS LEAD: 1	D.J. PAUL		
2) ASSEMBI	E COMPONENTS			
	CRITICAL	LITIES		
	OWNER HDW/FUNC	ABORT	HDW/FUN	C
FLIGHT I		RTLS	S: 1/1	
FREIR LTET	CRITICAI PHASE HDW/FUNC AUNCH: 3/3 OFF: 3/3 BIT: 3/2R BIT: 3/1R ING/SAFING: 3/3	TAL	3/2R	
	BTT: 3/2R	AOA	3/2R	
DEUBI	BTT: 3/1R	ATO	; 3/2R	
LAND	ING/SAFING: 3/3			
	SCREENS: A [2]	В[Р]	С[Р]	
LOCATION: PART NUMBER	OMS/RCS POD : FU & OX: MC284-0430-	0006,0005		
	NTAMINATION, VIBRATION,	DIFOR-DAR	T STRUCTURA	FAILURE,
LOSS OF SIG	NTAMINATION, VIBRATION, NAL FROM MDM	PIECE-FAR		,
EFFECTS/RATIONALE: REDUNDANCY FOR ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION FROM DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY RESULT IN LOSS OF VEHICLE DURING ENTRY DUE TO INABILITY TO CONTROL VEHICLE. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE THE INABILITY TO EXPEL ENOUGH RCS AND/OR OMS PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES. REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5;				
VS70-943099	REV B EO B12 (43DE); R	CS SFOM, I	FIG. 3-4.	

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 268	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: MANIFOLD 1, G FAILURE MODE: FAILS TO CLOS	ROUND PURGE/DRAIN COUPLING SE (FAILS OPEN), OR LEAKS EXTERNALLY
LEAD ANALYST: SUBSYS	LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYS 4) MANIFOLD 1, GROUND PURG 5) 6) 7) 8) 9)	
c	RITICALITIES
FLIGHT PHASEHDW/FUIPRELAUNCH:2/1RLIFTOFF:2/1RONORBIT:2/1RDEORBIT:2/1RLANDING/SAFING:2/1R	NC ABORT HDW/FUNC RTLS: 2/1R TAL: 2/1R AOA: 2/1R
REDUNDANCY SCREENS: A [2	B [NA] C [P]

LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS, AND/OR THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DH).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 269 ITEM: MANIFOLD 1, GROUND FAILURE MODE: FAILS TO OPEN (FAIL	F: A: PURGE/DRAIN CO	TICALITY HDW/FUNC LIGHT: 3/3 BORT: 3/3 DUPLING	
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, GROUND PURGE/DRAI 5) 6) 7) 8) 9)			
CRITICA	LITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	ABORT	HDW/FUNC	
PRELAUNCH: 3/3	RTLS:	3/3	
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	TAL:	3/3	
ONORBIT: 3/3	AOA:	3/3	
DEORBIT: 3/3	ATO:	3/3	
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A []	B[]	c []	
LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801			
CAUSES: CONTAMINATION, VIBRATION,	PIECE-PART S	TRUCTURAL FAILURE	
EFFECTS/RATIONALE: NONE.			

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DH).

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:3/3MDAC ID:270ABORT:3/3		
ITEM: MANIFOLD 2, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY		
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, ISOL VLV 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		
LIFTOFF: 3/3 TAL: 3/3		
ONORBIT: 3/3 AOA: 3/3		
DEORBIT: 3/3 ATO: 3/3		
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [] B [] C []		
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0006,0005		
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM		

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DE).

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 271	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 1/1		
ITEM: MANIFOLD 2, ISOL VLV FAILURE MODE: FAILS TO OPEN (FAILS	CLOSED)		
LEAD ANALYST: SUBSYS LEAD: D.	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, ISOL VLV 5) 6) 7) 8) 9)			
CRITICALI	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:1/1TAL:3/2RAOA:3/2RATO:3/2R		
REDUNDANCY SCREENS: A [2]	B[P] C[P]		
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-00	006,0005		
CAUSES: CONTAMINATION, VIBRATION, D LOSS OF SIGNAL FROM MDM	PIECE-PART STRUCTURAL FAILURE,		
EFFECTS/RATIONALE: REDUNDANCY FOR ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION FROM DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY RESULT IN LOSS OF VEHICLE DURING ENTRY DUE TO INABILITY TO CONTROL VEHICLE. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE THE INABILITY TO EXPEL ENOUGH RCS AND/OR OMS PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES.			
REFERENCES: JSC 11174, SPACE SHUTT VS70-943099 REV B EO B12 (43DE); RCS	LE SYSTEMS HANDBOOK, 11.5; S SFOM, FIG. 3-4.		

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM: A	ARCS		FLIGHT:	2/1R
MDAC ID: 2	272		ABORT:	2/1R

ITEM: MANIFOLD 2, GROUND PURGE/DRAIN COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS EXTERNALLY

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

HARDWARE COMPONENTS
 ASSEMBLIES
 PROP STOR & DIST SUBSYSTEM
 MANIFOLD 2, GROUND PURGE/DRAIN COUPLING
 6)
 7)
 8)
 9)

	CRITICA	LITIES	
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: OMS/RCS THRUSTER ACCESS PANEL

PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS, AND/OR THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DH).

SUBSYSTEM: ARCS MDAC ID: 273 TTEM: MANIFOLD 2, GROUND F	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3 PURGE/DRAIN COUPLING				
FAILURE MODE: FAILS TO OPEN (FAILS	5 CLOSED)				
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, GROUND PURGE/DRAIN 5) 6) 7) 8) 9)	N COUPLING				
CRITICA	LITIES				
	ABORT HDW/FUNC				
PRELAUNCH: 3/3	RTLS: 3/3 TAL: 3/3				
PRELAUNCH: 3/3 LIFTOFF: 3/3	TAL: 3/3				
ONORBIT: 3/3	AOA: 3/3				
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3				
LANDING/SAFING: 3/3					
REDUNDANCY SCREENS: A []	B[] C[]				
LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801					
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE					
EFFECTS/RATIONALE: NONE.					

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DH).

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:3/3MDAC ID:274ABORT:3/3
ITEM: MANIFOLD 3, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, ISOL VLV 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3
DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0006,0005
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM
EFFECTS/RATIONALE:

EFFECTS/RATIONALE: NONE.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DF).

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SUBS	: 2/26/87 YSTEM: ARCS : ID: 275	HIGHEST	CRITICALITY FLIGHT: ABORT:	3/1R	
FAII	I: MANIFOLD 3, IS JURE MODE: FAILS TO OPEN	(FAILS CLOSED)			
LEAD	ANALYST: SUBSYS	LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, ISOL VLV 5) 6) 7) 8) 9)					
	C	RITICALITIES			
	FLIGHT PHASE HDW/FU	ABORT	HDW/FUN	C	
	FLIGHT PHASE HDW/FO		I.S. 1/1	-	
	PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	ጠ እ	LS: 1/1 L: 3/2R A: 3/2R		
	LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R		3 - 3/2R		
	ONORBIT: 3/2R	AU.	$A: \frac{J}{2R}$		
	DEORBIT: 3/1R	AT	0: 3/2R		
	LANDING/SAFING: 3/3				
RED	UNDANCY SCREENS: A [2] B[P]	С[Р]		
LOCI PAR	ATION: OMS/RCS POD I NUMBER: FU & OX: MC284	-0430-0006,0005			
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM					
EFFECTS/RATIONALE: REDUNDANCY FOR ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION FROM DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY RESULT IN LOSS OF VEHICLE DURING ENTRY DUE TO INABILITY TO CONTROL VEHICLE. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE THE INABILITY TO EXPEL ENOUGH RCS AND/OR OMS PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES.					
			MS HANDBOOK.	11.5;	

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DF); RCS SFOM, FIG. 3-4.

DATE: 2/26/8 SUBSYSTEM: ARCS MDAC ID: 276	7		ITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: MANIF FAILURE MODE: FAILS	OLD 3, GROUND H TO CLOSE (FAII	PURGE/DRAIN (LS OPEN), OR	COUPLING LEAKS EXT	ERNALLY
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9)				
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC 2/1R 2/1R 2/1R 2/1R 2/1R		2/1R 2/1R	
REDUNDANCY SCREENS:	A [2]	B [NA]	С[Р]	

LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS, AND/OR THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

SUBSYSTEM: ARCS MDAC ID: 277 ITEM: MANIFOLD 3, GROUND P	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3 URGE/DRAIN COUPLING			
FAILURE MODE: FAILS TO OPEN (FAILS	CLOSED)			
LEAD ANALYST: SUBSYS LEAD: I	D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9)				
CRITICAL	ITIES			
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC			
$\mathbf{D} \mathbf{D} \mathbf{\nabla} \mathbf{I} \mathbf{X} \mathbf{I} \mathbf{N} \mathbf{C} \mathbf{Y} \mathbf{I} \mathbf{X} \mathbf{S} \mathbf{X}^{2}$	RTLS: 3/3			
LIFTOFF: 3/3	TAL: 3/3			
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3			
DEORBIT: 3/3	ATO: 3/3			
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A []	в[] С[]			
LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801				
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE				
EFFECTS/RATIONALE: NONE.				

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:3/3MDAC ID:278ABORT:3/3					
ITEM: MANIFOLD 4, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY					
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL					
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, ISOL VLV 5) 6) 7) 8) 9)					
CRITICALITIES					
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3					
PRELAUNCH: 3/3 RTLS: 3/3					
LIFTOFF: 3/3 TAL: 3/3					
ONORBIT: 3/3 AOA: 3/3					
DEORBIT: 3/3 ATO: 3/3					
LANDING/SAFING: 3/3					
REDUNDANCY SCREENS: A [] B [] C []					
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0006,0005					
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM					

EFFECTS/RATIONALE: NONE.

HIGHEST CRITICALITY HDW/FUNC 2/26/87 DATE: 3/1R FLIGHT: SUBSYSTEM: ARCS ABORT: 1/1 279 MDAC ID: MANIFOLD 4, ISOL VLV ITEM: FAILURE MODE: FAILS TO OPEN (FAILS CLOSED) SUBSYS LEAD: D.J. PAUL LEAD ANALYST: BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, ISOL VLV 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: TAL: AOA: ATO: 1/1 PRELAUNCH: 3/3 3/2R 3/3 LIFTOFF: 3/2R 3/2R ONORBIT: 3/2R 3/1R DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [2] B [P] C [P] LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0430-0006,0005 CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM EFFECTS/RATIONALE: REDUNDANCY FOR ALL PHASES EXCEPT RTLS FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION FROM DIFFERENT MANIFOLDS. LOSS OF ALL REDUNDANCY MAY RESULT IN LOSS OF VEHICLE DURING ENTRY DUE TO INABILITY TO CONTROL VEHICLE. DURING RTLS, JETS ON OTHER MANIFOLDS FIRING IN THE SAME DIRECTION AS THOSE ON THIS MANIFOLD ARE NOT CONSIDERED TO BE REDUNDANT, SINCE LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE THE INABILITY TO EXPEL ENOUGH RCS AND/OR OMS PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DF); RCS SFOM, FIG. 3-4.

SUBSY	STEM: ARC ID: 280		HIGHEST CH	RITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R		
	ITEM: MANIFOLD 4, GROUND PURGE/DRAIN COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS EXTERNALLY						
LEAD	ANALYST:	SUBSYS LEAD: 1	D.J. PAUL				
1) 2) 3)	BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8)						
CRITICALITIES							
F	PRELAUNC LIFTOFF: ONORBIT: DEORBIT:	2/1R 2/1R	RTLS:	2/1R 2/1R 2/1R 2/1R	8		

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

LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS, AND/OR THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: ARCS FLIGHT: 3/3 MDAC ID: 281 ABORT: 3/3 ITEM: MANIFOLD 4, GROUND PURGE/DRAIN COUPLING				
FAILURE MODE: FAILS TO OPEN (FAILS CLOSED)				
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9)				
CRITICALITIES				
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3				
PRELAUNCH: 3/3 RTLS: 3/3				
LIFTOFF: 3/3 TAL: 3/3				
ONORBIT: 3/3 AOA: 3/3				
DEORBIT: 3/3 ATO: 3/3				
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3851,3801				
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE				
EFFECTS/RATIONALE: NONE.				

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DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:3/3MDAC ID:282ABORT:3/3				
ITEM: MANIFOLD 5, ISOL VLV FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS INTERNALLY				
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, ISOL VLV 5) 6) 7) 8) 9)				
CRITICALITIES				
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3				
PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3				
LIFTOFF: 3/3 TAL: 3/3				
ONORBIT: 3/3 AOA: 3/3				
DEORBIT: 3/3 ATO: 3/3				
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0420-0012,0011				
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM				
EFFECTS/RATIONALE:				

NONE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 283		HIGHEST CR	ITICALITY FLIGHT: ABORT:	2/2	
ITEM: MANIFOLD FAILURE MODE: FAILS TO) 5, ISOL VLV D OPEN (FAILS	CLOSED)			
LEAD ANALYST: SU	JBSYS LEAD: D	.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, ISOL VLV 5) 6) 7) 8) 9)					
	CRITICAL	TTIES			
FLIGHT PHASE H PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING (SAFING:	IDW/FUNC	ABORT	HDW/FUN	С	
DDFLAUNCH.	3/3	RTLS:	3/3		
T TEMORE.	3/3	TAT.:	3/3		
	2/2	202:	3/3		
UNURBIT:	2/2	300.	3/3		
DEORBIT:	3/3	AIO.	5/5		
LANDING/SAFING:	3/3				
REDUNDANCY SCREENS: A		в[]	с[]		
LOCATION: OMS/RCS POD PART NUMBER: FU & OX: MC284-0420-0012,0011					
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE, LOSS OF SIGNAL FROM MDM					
EFFECTS/RATIONALE: FAILURE RESULTS IN LOSS OF VRCS.					
DEFEDENCES. ICC 11174	SDACE SHITT	T.E SYSTEMS	HANDBOOK.	11.5;	

DATE: 2/26/8 SUBSYSTEM: ARCS MDAC ID: 284	7		ITICALITY FLIGHT: ABORT:			
FAILURE MODE: FAILS	ITEM: MANIFOLD 5, GROUND PURGE/DRAIN COUPLING FAILURE MODE: FAILS TO CLOSE (FAILS OPEN), OR LEAKS EXTERNALLY					
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8)						
	CRITICA	LITIES				
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC 2/1R 2/1R 2/1R 2/1R 2/1R	ABORT RTLS:	2/1R	2		
REDUNDANCY SCREENS:	A [2]	B [NA]	С[Р]			

LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3451,3401

CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FIRST FAILURE (COUPLING OR COUPLING CAP) CANNOT BE DETECTED. NEXT ASSOCIATED FAILURE WILL RESULT IN PROPELLANT LEAKING OVERBOARD WHICH COULD IGNITE DURING ASCENT, ENTRY, OR ABORTS, RESULTING IN LOSS OF VEHICLE. DURING ONORBIT, LOSS OF ALL REDUNDANCY WILL CAUSE LOSS OF LIFE FOLLOWING EVA OPERATIONS IF EVA SUITS ARE CONTAMINATED BY LEAKING PROPELLANT. LOSS OF THE THREE PRIMARY JETS ON THIS MANIFOLD MAY CAUSE INABILITY TO EXPEL ENOUGH PROPELLANTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS, AND/OR THE CG SAFETY BOUNDARIES. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 285		HIGHEST CR	TTICALITY FLIGHT: ABORT:		
ITEM: MANIFO FAILURE MODE: FAILS	LD 5, GROUND P TO OPEN (FAILS	URGE/DRAIN CLOSED)	COUPLING		
LEAD ANALYST:	SUBSYS LEAD: I	J.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, GROUND PURGE/DRAIN COUPLING 5) 6) 7) 8) 9)					
	CRITICAL	ITIES			
FLIGHT PHASE PRELAUNCH:	HDW/FUNC	ABORT	HDW/FUN	C	
PRELAUNCH:	3/3	RTLS:	3/3		
LIFTOFF:	3/3	TAL:	3/3		
ONORBIT:	3/3		3/3		
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	3/3	ATO:	3/3		
LANDING/SAFING	: 3/3				
REDUNDANCY SCREENS: A [] B [] C []					
LOCATION: OMS/RCS THRUSTER ACCESS PANEL PART NUMBER: FU & OX: MC276-0018-3451,3401					
CAUSES: CONTAMINATION, VIBRATION, PIECE-PART STRUCTURAL FAILURE					

EFFECTS/RATIONALE: NONE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 286 ITEM: MANIFOLD ISOL VLVS	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1			
FAILURE MODE: LEAKS EXTERNALLY				
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL			
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD ISOL VLVS, ALL 5) 6) 7) 8) 9)				
CRITICA				
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC			
PRELAUNCH: 1/1 LIFTOFF: 1/1	RTLS: 1/1 TAL: 1/1			
LIFTOFF: 1/1	TAL: 1/1			
ONORBIT: 1/1	AOA: 1/1			
ONORBIT: 1/1 DEORBIT: 1/1	ATO: 1/1			
LANDING/SAFING: 1/1				
REDUNDANCY SCREENS: A []	в[] С[]			
LOCATION: OMS/RCS POD PART NUMBER: FU & OX:				
CAUSES: VIBRATION, PIECE-PART STR	UCTURAL FAILURE			
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LEAKING INTO POD/VEHICLE, CAUSING CORROSION WHICH CAN RESULT IN ELECTRICAL SHORTS AND PROPELLANT IGNITION.				

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DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 287	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: MANIFOLD ISOL VLVS FAILURE MODE: RESTRICTED FLOW	
LEAD ANALYST: SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD ISOL VLVS, ALL 5) 6) 7) 8) 9)	
CRITIC	ALITIES
CRITIC FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 1/1 AOA: 1/1 ATO: 1/1
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: OMS/RCS POD PART NUMBER: FU & OX:	
CAUSES: VIBRATION, PIECE-PART ST	RUCTURAL FAILURE
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PF RESULTING IN ZOTS AND/OR THRUSTER VEHICLE.	OPELLANT MIXTURE RATIO, NOZZLE BURNTHROUGH AND LOSS OF

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:1/1MDAC ID:288ABORT:1/1
ITEM: JET ALIGNMENT BELLOWS, PRIMARY, ALL AXES FAILURE MODE: STRUCTURAL FAILURE (RUPTURE OR LEAK)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) JET ALIGNMENT BELLOWS, PRIMARY, ALL AXES 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:1/11/1
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: FUEL/OXIDIZER LINES LEADING INTO JET BIPROPELLANT

LOCATION: FUEL/OXIDIZER LINES LEADING INTO JET BIPROPELLANT VALVE PART NUMBER: FU & OX: 73P550003-1002,1001

CAUSES: HIGH PRESSURE, VIBRATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS FAILURE CAUSES PROPELLANT TO LEAK INTO THE POD/VEHICLE. THERE ARE TWO ALIGNMENT BELLOWS PER PRCS JET. LOSS OF PROPELLANT CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROPELLANT IGNITION.

SUBSYSTEM: ARCS MDAC ID: 289	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 1/1 ABORT: 1/1
ITEM: JET ALIGNMENT BEL FAILURE MODE: RESTRICTED FLOW	LOWS, PRIMARY, ALL AXES
LEAD ANALYST: SUBSYS LEAD): D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) JET ALIGNMENT BELLOWS, PRIM 5) 6) 7) 8) 9)	ARY, ALL AXES
CRITI	CALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 1/1 ONORBIT: 1/1 DEORBIT: 1/1 LANDING (SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 1/1
LIFTOFF: 1/1	TAL: $1/1$
ONORBIT: 1/1	
DEORBIT: 1/1	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: FUEL/OXIDIZER LINE VALVE	S LEADING INTO JET BIPROPELLANT
PART NUMBER: FU & OX: 73P550003	9-1002,1001
CAUSES: VACUUM, PIECE-PART STRU	CTURAL FAILURE
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE F	PROPELLANT MIXTURE RATIO,

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

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DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:1/1MDAC ID:290ABORT:1/1
ITEM: THRUSTER BIPROP SOLENOID VLVS, PRIMARY, ALL AXES FAILURE MODE: FAILS TO CLOSE (FAILS OPEN/ON)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLVS, PRIMARY, ALL AXES 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1
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: JET ASSEMBLY PART NUMBER: FU & OX:
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE
EFFECTS/RATIONALE: A FAILED ON JET CAN CAUSE CONTACT WITH PAYLOADS DURING RENDEZVOUS, RESULTING IN LOSS OF VEHICLE, AND/OR EVA CREW, AND CAN CAUSE LOSS OF VEHICLE DURING ENTRY OR ABORTS. RM WILL NOT DESELECT JET, MUST BE SECURED BY CREW CLOSING ITS MANIFOLD. INHALATION OF PROPELLANT VAPORS ON THE GROUND CAN CAUSE LOSS OF LIFE.
REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DH); FLIGHT RULE 6-95.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 291		HIGHEST CI	RITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 1/1
ITEM: THRUST FAILURE MODE: LEAKS	ER BIPROP SOLE EXTERNALLY, ON	NOID VLVS, E PROPELLA	PRIMARY, A NT	LL AXES
LEAD ANALYST:	SUBSYS LEAD: I	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) THRUSTER SUBSYST 4) THRUSTER BIPROP 5) 6) 7) 8) 9)	τM	, PRIMARY, .	ALL AXES	
	CRITICAL	LITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUN	IC
PRELAUNCH:	1/1 1/1 1/1 1/1	RTLS	: 1/1 1/1 1/1	
LIFTOFF:	1/1	TAL:	1/1	
ONORBIT:	1/1	AOA:	1/1	
DEORBIT:	$\frac{1}{1}$	ATO:	1/1	
LANDING/SAFING	;: 1/1			
REDUNDANCY SCREENS:	A[]	В[]	c []	
LOCATION: JET ASS PART NUMBER: FU & OX				
CAUSES: CONTAMINATIO	ON, PIECE-PART	STRUCTURAL	FAILURE	
EFFECTE / DATIONALE .				

EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LEAKING INTO POD/VEHICLE, CAUSING CORROSION WHICH COULD RESULT IN ELECTRICAL SHORTS AND PROPELLANT IGNITION.

REFERENCES: JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, 11.5; VS70-943099 REV B EO B12 (43DH); FLIGHT RULE 6-95.

C-193

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:1/1MDAC ID:292ABORT:1/1ITEM:THRUSTER BIPROP SOLENOID VLVS, PRIMARY, ALL AXESFAILURE MODE:RESTRICTED FLOW
FAILURE MODE: RESTRICTED FLOW
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLVS, PRIMARY, ALL AXES 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1
PRELAUNCH: 3/3 RTLS: 1/1
LIFTOFF: 1/1 TAL: 1/1
ONORBIT: 1/1 AOA: 1/1
DEORBIT: $1/1$ ATO: $1/1$
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 293			RITICALITY FLIGHT: ABORT:	3/1R
ITEM: THRUSTE FAILURE MODE: FAILS T	R BIPROP SOLE O OPEN (FAILS	NOID VLVS, CLOSED)	PRIMARY, +	X AXIS
LEAD ANALYST: S	UBSYS LEAD: D	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) THRUSTER SUBSYSTEN 4) THRUSTER BIPROP So 5) 6) 7) 8) 9)	м	PRIMARY, -	+X AXIS	
	CRITICAL	TTTES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 3/2R 3/1R 3/3	ABORT RTLS: TAL: AOA: ATO:	3/2R 3/2R	с
REDUNDANCY SCREENS:	A [2]	В[Р]	С[Р]	
LOCATION: JET ASSE PART NUMBER: FU & OX:				
CAUSES. CONTANTNATION	I. PIECE-PART	STRUCTURAL	FAILURE, L	OSS OF

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE, SIGNAL FROM MDM, LOW TEMPERATURE FREEZES PROPELLANT IN VALVE

EFFECTS/RATIONALE:

REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION. RM WILL DESELECT JET. FAILURE MAY AFFECT ONORBIT OPERATIONS AND WILL AFFECT THE + X JET RCS DEORBIT CAPABILITY. FAILURE MAY ALSO AFFECT RCS AND OMS DUMPS DURING ABORTS.

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:1/1MDAC ID:294ABORT:3/3
ITEM: THRUSTER BIPROP SOLENOID VLVS, PRIMARY, +X AXIS FAILURE MODE: LEAKS INTERNALLY, ONE PROPELLANT
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLVS, PRIMARY, +X AXIS 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:1/1AOA:3/3DEORBIT:3/1RATO:3/3LANDING/SAFING:1/11/1
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN PROPELLANT LEAKING INTO COMBUSTION CHAMBER, WHERE IT CAN FREEZE, RESULTING IN LOSS OF THE JET. RM WILL ANNOUNCE THE JET AS FAILED LEAKING AND DESELECT THE JET. FAILURE WILL CAUSE LOSS OF RCS DEORBIT CAPABILITY. LEAKAGE ONORBIT CAN CAUSE LOSS OF LIFE FOLLOWING EVA IF EVA CREW IS CONTAMINATED BY PROP. PROPELLANTS WILL NOT HAVE ENOUGH TIME TO FREEZE DURING ABORTS.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 295	,	HIGHEST CRIT FL AB	ICALITY IGHT: ORT:	3/1R
ITEM: THRUST FAILURE MODE: FAILS	TER BIPROP SOLI TO OPEN (FAIL	ENOID VLVS, PR S CLOSED)	IMARY, Y	AXIS
LEAD ANALYST:	SUBSYS LEAD:	D.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONE 2) ASSEMBLIES 3) THRUSTER SUBSYST 4) THRUSTER BIPROP 5) 6) 7) 8) 9)	יד:M	, PRIMARY, Y A	XIS	
	CRITTCA	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEODBIT:	HDW/FUNC	ABORT	HDW/FUNC	2
DOFININCH.	3/3	RTLS:	3/1R	
T TEMORE.	3/3	TAL:	3/1R	
	3/2R	AOA:	3/1R	
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFIN	G: 3/3		·	
REDUNDANCY SCREENS:		B [P]	С[Р]	
LOCATION: JET AS: PART NUMBER: FU & O				
CAUSES: CONTAMINATI SIGNAL FROM MDM, LOW	ON, PIECE-PARI TEMPERATURE F	STRUCTURAL FA	AILURE, LO LANT IN VA	DSS OF ALVE
EFFECTS/RATIONALE:				

EFFECTS/RATIONALE: REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY THRUSTERS WHICH FIRE IN THE SAME DIRECTION. RM WILL DESELECT JET. FAILURE MAY AFFECT ONORBIT OPS AND MAY RESULT IN LOSS OF VEHICLE CONTROL DURING ENTRY. FAILURE MAY ALSO AFFECT RCS AND OMS DUMPS DURING ABORTS.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 296		HIGHEST CH	RITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 3/3
ITEM: THRUSTER FAILURE MODE: LEAKS IN	BIPROP SOLEN TERNALLY, ONE	IOID VLVS, E PROPELLAN	PRIMARY, Y IT	AXIS
LEAD ANALYST: SU	BSYS LEAD: D	J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENT 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SO 5) 6) 7) 8) 9)		PRIMARY, Y	AXIS	
	CRITICALI	TIES		
FLIGHT PHASE HI PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	W/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	1/1	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	1/1	202.	3/3	
DEORBIT:	3/18	ATO:	2/2	
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	1/1	AIO.	3/3	
Zhornoy bar ing.	±/ ±			
REDUNDANCY SCREENS: A	[] B	[]	с[]	
LOCATION: JET ASSEME PART NUMBER: FU & OX:	BLY			
CAUSES: CONTAMINATION,	PIECE-PART ST	TRUCTURAL	FAILURE	
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPE WHERE IT CAN FREEZE, RES ANNOUNCE THE JET AS FAIL FAILURE OF ALL REDUNDANC ENTRY. LEAKAGE ONORBIT EVA CREW IS CONTAMINATED ENOUGH TIME TO FREEZE DU PROPELLANTS WILL NOT HAV INHALATION OF PROP VAPOR	ULTING IN LOS LED LEAKING A Y MAY RESULT CAN CAUSE LOS BY PROP. PH IRING ABORTS. E ENOUGH TIMI	SS OF THE C ND DESELEC IN LOSS OF S OF LIFE ROPELLANTS E TO FREEZ	JET. RM WII T THE JET. F CONTROL DU FOLLOWING E WILL NOT HA E DURING ABO	LL JRING EVA IF EVE

INHALATION OF PROP VAPORS ON GROUND CAN CAUSE LOSS OF LIFE.

DATE SUBS MDAC	: YSTEM: ID:	2/26/87 ARCS 297		HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM FAIL	URE MOD	THRUSTI E: FAILS	ER BIPROP SOLI TO OPEN (FAIL	ENOID VLVS, S CLOSED)	, PRIMARY, Z	AXIS
LEAD	ANALYS	T: :	SUBSYS LEAD:	D.J. PAUL		
1) 2) 2)	HARDWAH ASSEMB	IERARCHY: RE COMPONEN LIES ER SUBSYSTI ER BIPROP S	NTS EM SOLENOID VLVS	, PRIMARY,	Z AXIS	
			CRITICA	LITIES		
	FLIGHT PREL LIFT ONOR DEOR LAND	PHASE AUNCH: OFF: BIT: BIT: ING/SAFING	HDW/FUNC 3/3 3/3 3/2R 3/1R	ABORT RTLS TAL: AOA: ATO:	HDW/FUN 5: 3/1R 3/1R 3/1R 3/1R 3/1R	с
REDU	JNDANCY	SCREENS:	A [2]	В[Р]	C [P]	
loca Pari	TION: NUMBER	JET ASSI : FU & OX	EMBLY :			
CAUS SIGN	ES: CO IAL FROM	NTAMINATIO MDM, LOW	N, PIECE-PART TEMPERATURE F	STRUCTURA REEZES PROI	L FAILURE, L PELLANT IN V	OSS OF ALVE
REDU IN 7 ONOF	HE SAME	FOR THIS F DIRECTION AND MAY R LURE MAY A	UNCTION IS PR . RM WILL DE ESULT IN LOSS LSO AFFECT RC	SELECT JET	E CONTROL DU	AY AFFECT

DATE:2/26/87HIGHEST CRITICALITYHDW/FSUBSYSTEM:ARCSFLIGHT:1/1MDAC ID:298ABORT:3/3	
ITEM: THRUSTER BIPROP SOLENOID VLVS, PRIMARY, Z AXIS FAILURE MODE: LEAKS INTERNALLY, ONE PROPELLANT	
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLVS, PRIMARY, Z AXIS 5) 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:1/1AOA:3/3DEORBIT:3/1RATO:3/3LANDING/SAFING:1/11/1	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:	

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE RESULTS IN PROPELLANT LEAKING INTO COMBUSTION CHAMBER, WHERE IT CAN FREEZE, RESULTING IN LOSS OF THE JET. RM WILL ANNOUNCE THE JET AS FAILED LEAKING AND DESELECT THE JET. FAILURE OF ALL REDUNDANCY MAY RESULT IN LOSS OF CONTROL DURING ENTRY. LEAKAGE ONORBIT CAN CAUSE LOSS OF LIFE FOLLOWING EVA IF EVA CREW IS CONTAMINATED BY PROP. PROPELLANTS WILL NOT HAVE ENOUGH TIME TO FREEZE DURING ABORTS.

DATE: 2/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: ARCS FLIGHT: 1/1 MDAC ID: 299 ABORT: 1/1 ITEM: JET ALIGNMENT BELLOWS, VERNIER, ALL AXES
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE OR LEAR)
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) PROP STOR & DIST SUBSYSTEM 4) JET ALIGNMENT BELLOWS, VERNIER, ALL AXES 5) 6) 7) 8) 9)
CRITICALITIES
CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:1/1LIFTOFF:1/1TAL:1/1ONORBIT:1/1AOA:1/1DEORBIT:1/1ATO:1/1LANDING/SAFING:1/11/1
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: FUEL/OXID LINES LEADING INTO JET BIPROP VALVE PART NUMBER: FU & OX:
CAUSES: HIGH PRESSURE, VIBRATIOPN, PIECE-PART STRUCTURAL FAILURE
EFFECTS/RATIONALE: THIS FAILURE CAUSES PROP TO LEAK INTO THE POD/VEHICLE. LOSS OF PROP CAN CAUSE CORROSION, LEADING TO ELECTRICAL SHORTS AND PROP IGNITION. FAILURE CAUSES HAZARD TO GROUND CREW.

DATE: 2/26/8 SUBSYSTEM: ARCS MDAC ID: 300	7 HIG	HEST CRITICALITY FLIGHT: ABORT:	HDW/FUNC 1/1 3/3
ITEM: JET A FAILURE MODE: RESTR	LIGNMENT BELLOWS, V ICTED FLOW	ERNIER, ALL AXES	
LEAD ANALYST:	SUBSYS LEAD: D.J.	PAUL	
BREAKDOWN HIERARCHY: 1) HARDWARE COMPON 2) ASSEMBLIES 3) PROP STOR & DIS 4) JET ALIGNMENT B 5) 6) 7) 8) 9)		L AXES	
	CRITICALITIE	5	
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC A1 3/3 3/3 1/1 3/3	BORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
REDUNDANCY SCREENS:	A [] B[] C[]	

LOCATION: FUEL/OXID LINES LEADING INTO JET BIPROP VALVE PART NUMBER: FU & OX:

CAUSES: VACUUM, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

MDAC	ID:			·			FLIGHT: ABORT:	3/3
FAILU	JRE MOD	E: FAILS 1	O CLC	SE (FA		FER/OI	S, VERNIEF N)	RS, ALL AXES
LEAD	ANALYS	T: S	UBSYS	LEAD:	D.J.	PAUL		
1)	HARDWAL	IERARCHY: RE COMPONEN LIES ER SUBSYSTE ER BIPROP S		ID VLV	s, VI	ERNIER	S, ALL AXE	S
				CRITIC	ALIT	IES		_
	FLIGHT	PHASE AUNCH: OFF: BIT: BIT:	HDW/H	TUNC		ABORT	HDW/	'FUNC
	PREL	AUNCH:	3/3	3		RT	LS: $3/$	/3
	ד.ד דיד	OFF:	3/3	3		TA	L: 3/	'3
	ONOR	BTT:	1/1	L		AO.	A: 3/	'3
	DFOR	8TT.	3/:	3		AT	0: 3/	/3
	LAND	ING/SAFING:	3/:	3				
REDU		SCREENS:			B	נ ז	c []
LOCA PART	TION: NUMBER	JET ASSE TI & OX	MBLY					
CAUS	ES: CO	NTAMINATION	I, PI	ECE-PAF	T STI	RUCTUR	AL FAILUR	Ξ
FAIL JET; JET	URE RES MUST E CAN CAU	IONALE: ULTS IN LOS E SECURED I SE CONTACT VEHICLE AN	BY CR WITH	EW CLOS PAYLO	ADS D	LTS MA	MITULD.	DESELECT A FAILED ON S, RESULTING

DATE: 2/26/87 H SUBSYSTEM: ARCS MDAC ID: 302	IGHEST CRITICALITY HDW/FUNC FLIGHT: 2/2 ABORT: 3/3
ITEM: THRUSTER BIPROP SOLENO FAILURE MODE: FAILS TO OPEN (FAILS C	ID VLVS, VERNIERS, ALL AXES LOSED)
LEAD ANALYST: SUBSYS LEAD: D.J.	. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLVS, VI 5) 6) 7) 8) 9)	ERNIERS, ALL AXES
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC	
	RTLS: 3/3
ONORBIT: 2/2	TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	AOA: 3/3 ATO: 3/3
LANDING/SAFING: 3/3	A10. 5/5
REDUNDANCY SCREENS: A [] B [] c[]
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:	
CAUSES: CONTAMINATION, PIECE-PART STR SIGNAL FROM MDM, LOW TEMPERATURE FREEZ	UCTURAL FAILURE, LOSS OF ES PROPELLANT IN VALVE

EFFECTS/RATIONALE:

FAILURE RESULTS IN LOSS OF VERNIER RCS. RM WILL DESELECT JET. FAILURE CANNOT BE DETECTED UNTIL JET IS COMMANDED TO FIRE.

DATE: 2/26/87 SUBSYSTEM: ARCS MDAC ID: 303			AITICALITY FLIGHT: ABORT:	1/1 1/1
ITEM: THRUSTER FAILURE MODE: LEAKS EXT			T T	
LEAD ANALYST: SU	BSYS LEAD: D	.J. PAUL		
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOL 5) 6) 7) 8) 9)		VERNIERS,	ALL AXES	
	CRITICAL	ITIES		
FLIGHT PHASE HI	DW/FUNC	ABORT	HDW/FUN	íC
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT:	1/1	KT TO 4	· · · · ·	
LIFTOFF:	1/1	TAL:	1/1	
ONORBIT:	1/1	AOA: ATO:	1/1 1/1	
LANDING/SAFING:	1/1	ALOI	_/ _	
LANDING/SAFING.	±/ ±			
REDUNDANCY SCREENS: A	[]	В[]	с[]	
LOCATION: JET ASSEMN PART NUMBER: FU & OX:	BLY			
CAUSES: CONTAMINATION,	PIECE-PART	STRUCTURAL	FAILURE	
EFFECTS/RATIONALE: FAILURE RESULTS IN PROP CORROSION AND RESULTING IGNITION.	ELLANT LEAKI IN ELECTRIC	NG INTO PO AL SHORTS /	D/VEHICLE, AND PROPELI	CAUSING LANT

DATE:2/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:ARCSFLIGHT:1/1MDAC ID:304ABORT:3/3						
ITEM: THRUSTER BIPROP SOLENOID VLVS, VERNIERS, ALL AXES FAILURE MODE: LEAKS INTERNALLY, ONE PROPELLANT						
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL						
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLVS, VERNIERS, ALL AXES 5) 6) 7) 8) 9)						
CRITICALITIES						
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:1/1RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:1/1AOA:3/3DEORBIT:3/3ATO:3/3						
PRELAUNCH: 1/1 RTLS: 3/3						
LIFTOFF: 3/3 TAL: 3/3						
ONORBIT: 1/1 AOA: 3/3						
DEORBIT: $3/3$ ATO: $3/3$						
LANDING/SAFING: 1/1						
REDUNDANCY SCREENS: A [] B [] C []						
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:						
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE						
EFFECTS/RATIONALE: FAILURE RESULTS IN PROPELLANT LEAKING INTO INTO COMBUSTION CHAMBER, WHERE IT CAN FREEZE, RESULTING IN LOSS OF THE VERNIER						

CHAMBER, WHERE IT CAN FREEZE, RESULTING IN LOSS OF THE VERNIER RCS. LEAKAGE ONORBIT CAN CAUSE LOSS OF LIFE FOLLOWING EVA IF CREW IS CONTAMINATED BY PROPELLANTS. INHALATION OF PROP VAPORS ON GROUND CAN CAUSE LOSS OF LIFE.

DATE: 2/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: ARCS FLIGHT: 1/1 MDAC ID: 305 ABORT: 3/3 ITEM: THRUSTER BIPROP SOLENOID VLVS, VERNIERS, ALL AXES FAILURE MODE: RESTRICTED FLOW
LEAD ANALYST: SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) HARDWARE COMPONENTS 2) ASSEMBLIES 3) THRUSTER SUBSYSTEM 4) THRUSTER BIPROP SOLENOID VLVS, VERNIERS, ALL AXES 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:1/1AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:
CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL FAILURE
EFFECTS/RATIONALE: FAILURE MAY CAUSE UNACCEPTABLE PROPELLANT MIXTURE RATIO, RESULTING IN ZOTS AND/OR THRUSTER NOZZLE BURNTHROUGH AND LOSS OF VEHICLE.

DATE:	2/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	ARCS		FLIGHT:	1/1
MDAC ID:	306		ABORT:	1/1

ITEM: THRUSTER COMBUSTION CHAMBER OR NOZZLE EXTENSION, PRIMARY, ALL AXES FAILURE MODE: THRUSTER COMBUSTION CHAMBER OR NOZZLE EXTENSION BURNTHROUGH

LEAD ANALYST: SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

- 1) HARDWARE COMPONENTS
- 2) ASSEMBLIES
- 3) THRUSTER SUBSYSTEM
- 4) THRUSTER COMBUSTION CHAMBER OR NOZZLE EXTENSION, PRIMARY,
- ALL AXES
- 5)
- 6)
- 7)
- 8)
- 9)

	CRITICA		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	1/1	TAL:	ī/ī
ONORBIT:	1/1	AOA:	1/1
DEORBIT:	1/1	ATO:	1/1
LANDING/SAFING:	3/3		··· / –

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

LOCATION: JET ASSEMBLY PART NUMBER: FU & OX:

CAUSES: IMPROPER MIXTURE RATIO, PIECE-PART STRUCTURAL FAILURE

EFFECTS/RATIONALE: HOT, HIGH PRESSURE GAS VENTS INTO POD.

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			HICHEST C	RITICALITY	HDW/FUNC
DATE: SUBSYSTEM: MDAC ID:	2/26/87 ARCS 307		mignibi c	FLIGHT: ABORT:	1/1 3/3
ITEM:		COMBUSTION	CHAMBER OR	NOZZLE EXT	TENSION,
VERNIER, ALL FAILURE MODE BURNTHROUGH	: THRUSTER			NOZZLE EXT	TENSION
LEAD ANALYST	': SU	BSYS LEAD:	D.J. PAUL		
	E COMPONENTS		R NOZZLE EX	TENSION, V	ERNIER,
		CRITICA	LITIES		
FLIGHT F	PHASE HI LUNCH: DFF: BIT: BIT:	DW/FUNC	ABORT	HDW/FUI	NC
PRELA	UNCH:	3/3	RTLS	: 3/3	
LIFTC)FF:	3/3	TAL:	3/3	
ONORE	NUNCH: DFF: BIT: BIT:	$\frac{1}{1}$	ATO:	3/3	
LANDI	ING/SAFING:	3/3		•	
REDUNDANCY S	CREENS: A	[]	В[]	с[]	
LOCATION: PART NUMBER:		BLY			
CAUSES: IMP	ROPER MIXTU	RE RATIO, P	IECE-PART S	TRUCTURAL	FAILURE
EFFECTS/RATI FAILURE RESU INTO POD.	ONALE: JLTS IN LOSS	OF VRCS.	НОТ, НІGН Р	RESSURE GAS	5 VENTS
REFERENCES: VS70-943099	JSC 11174, REV B EO B:	SPACE SHUT 12 (43DH).	TLE SYSTEMS	S HANDBOOK,	11.5;

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 308			TICALITY LIGHT: BORT:	HDW/FUNC 2/1R 2/1R
ITEM: CONTROL FAILURE MODE: FAILS (LLER, REMOTE I OPEN	POWER		
LEAD ANALYST: V.J. BUI	RKEMPER	SUBSYS LEAD:	D.J. PAUI	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPON 2) CONTROLS 3) HE PRESS SUBSYSTE 4) HE OX & FU ISOL A 5) CONTROLLER, REMOT 6) 7) 8) 9)	M A & B VLVS			
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	HDW/FUNC 3/3 3/3 3/2R 2/1R 3/3	ABORT RTLS: TAL: AOA: ATO:	HDW/FUNC 2/1R 2/1R 2/1R 2/1R 2/1R	
REDUNDANCY SCREENS:	A [2]	B [P]	С[Р]	

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22RPC27; 82V76A23RPC27

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND SIGNAL TO OPEN FU & OX HE ISOL A/B VLV. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS FAILED CLOSED CASE. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ABORTS AND DEORBIT, LOSS OF LIFE/VEHICLE.

REFERENCES: VS70-942099 REV D EO DO1

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 309	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R				
ITEM: CONTROLLER, REMOTE PO FAILURE MODE: FAILS HIGH	OWER				
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)					
CRITICAL					
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R				
LIFTOFF: 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: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22RPC27; 82V76A23RPC27					
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD				

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE FU & OX HE ISOL A/B VLVS BECOMING STUCK INTO OPEN POSITION. THEREFORE THE HELIUM TK CANNOT BE ISOLATED FROM THE PROPELLANT SYSTEM, NO IMMEDIATE EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

REFERENCES: VS70-942099 REV D EO DO1

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 310			FICALITY LIGHT: BORT:	HDW/FUNC 3/1R 3/1R
ITEM: CONTRO FAILURE MODE: FAILS	LLER, REMOTE DOPEN	POWER		
LEAD ANALYST: V.J. BU	RKEMPER	SUBSYS LEAD:	D.J. PAUI	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPO 2) CONTROLS 3) HE PRESS SUBSYST 4) HE OX & FU ISOL 5) CONTROLLER, REMO 6) 7) 8) 9)	EM A & B VLVS			
	CRITICAL	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	3/3 3/1R 3/1R 3/1R	ABORT RTLS: TAL: AOA: ATO:	3/1R 3/1R	2
REDUNDANCY SCREENS:	A [2]	В[Р]	С[Р]	

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22RPC40; 82V76A23RPC39

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE ABILITY TO COMMAND FU & OX HE ISOL A/B VLVs CLOSED USING CREW SWITCH OR GPC. WORST CASE RESULTS IN HE ISOL A/B VLVs BECOMING STUCK IN THE OPEN POSITION. THEREFORE THE HE TK CANNOT BE ISOLATED FROM THE PROPELLANT SYSTEM, NO IMMEDIATE EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

REFERENCES: VS70-942099 REV D EO DO1

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 311	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: CONTROLLER, REMOTE : FAILURE MODE: FAILS HIGH	POWER
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)	
CRITICA	LITIES
TTCHT DHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $2/1R$
LIFTOFF: 3/3 ONORBIT: 3/2R	AOA: 2/1R
DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 1, PCA 1; F BA	5A23RPC39
CAUSES: CONTAMINATION, VIBRATION,	, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO COMMAND FU & OX HE ISOL A/B VLVS USING GPC. CREW SWITCH CAN STILL OPEN OR CLOSE VLVS. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN FU & OX HE ISOL A/B VLVS BECOMING STUCK IN THE CLOSED POSITION. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED.

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 2/1R MDAC ID: 312 ABORT: 2/1R ITEM: CONTROLLER, REMOTE POWER FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT FLIGHT PHASE HDW/FUNC 3/3 RTLS: 3/3 TAL: PRELAUNCH: 2/1R LIFTOFF: 2/1R ONORBIT: 3/2R AOA: 2/1RDEORBIT: 2/1R ATO: 2/1R LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: F BAY 2, PCA 2; F BAY 3, PCA 3 PART NUMBER: 82V76A23RPC26; 83V76A24RPC27

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CREW SWITCH SIGNAL TO OPEN FU & OX HE ISOL A/B VLV. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS FAILED CLOSED CASE. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ABORTS AND DEORBIT, LOSS OF LIFE/VEHICLE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 313	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: CONTROLLER, REMOTE P FAILURE MODE: FAILS HIGH	OWER
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R	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: F BAY 2, PCA 2; F BAY PART NUMBER: 82V76A23RPC26; 83V76A	24RPC27
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE FU & OX I INTO OPEN POSITION. THEREFORE THE FROM THE PROPELLANT SYSTEM, NO IMME REDUNDANCY IS POSSIBLE LOSS OF LIFE OVERPRESSURIZATION AND RUPTURE OF F	HELIUM TK CANNOT BE ISOLATED EDIATE EFFECT. LOSS OF ALL VEHICLE DUE TO

FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 314	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: CONTROLLER, REMOTE FAILURE MODE: FAILS OPEN	POWER
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/1RONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22RPC41; 82V76A23CR7

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE ABILITY TO COMMAND FU & OX HE ISOL A/B VLVs CLOSED USING CREW SWITCH OR GPC. WORST CASE RESULTS IN HE ISOL A/B VLVs BECOMING STUCK IN THE OPEN POSITION. THEREFORE THE HE TK CANNOT BE ISOLATED FROM THE PROPELLANT SYSTEM, NO IMMEDIATE EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 315 ABORT: 3/3 ITEM: CONTROLLER, REMOTE POWER
FAILURE MODE: FAILS HIGH
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: $3/3$ AOA: $3/3$
LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22RPC41; 82V76A23CR7
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:

LOSE CAPABILITY TO INHIBIT THE FU & OX HE ISOL A/B VLV "CLOSE" CMD. THE INHIBIT FUNCTION IS USED FOR POWER SAVINGS AND IN CASE OF A FAILURED ON COMMAND. NO EFFECT ON MISSION.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 316	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLY 5) DIODE 6) 7) 8) 9)	۷S
CR	ITICALITIES
FLIGHT PHASE HDW/FUN PRELAUNCH: 3/1R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	C ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[F]

LOCATION: F BAY 1, PCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16CR J1-85; 82V76A17CR J1-85

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

EFFECTS/RATIONALE:

LOSE ABILITY TO COMMAND FU & OX HE ISOL A/B VLVs CLOSED USING GPC. CREW SWITCH CAN STILL OPEN OR CLOSE VLVS. LOSS OF ALL REDUNDANCY IS POSSIBLE INABILITY TO ISOLATE HE SYSTEM LEADING TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 317	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R
PRELAUNCH: 3/1R	RTLS: 3/1R
LIFTOFF: 3/1R	TAL: $3/1R$
ONORBIT: 3/1R	AUA: 3/1R
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[F]
LOCATION: F BAY 1, PCA 1; F BAY PART NUMBER: 81V76A16CR J1-85; 82V	Y 2, LCA 2 /76A17CR J1-85
CAUSES: CONTAMINATION, VIBRATION, N OVERLOAD	MECHANICAL SHOCK, THERMAL SHOCK,

EFFECTS/RATIONALE:

LOSE ISOLATION BETWEEN GPC AND CREW SWITCH CLOSE COMMANDS. THE FAILURE CAN RESULT IN LOSS OF THE GPC OR CREW SWITCH TO OPERATE THE FU & OX HE ISOL A/B VLVS. LOSS OF ALL REDUNDANCY IS POSSIBLE INABILITY TO ISOLATE HE SYSTEM LEADING TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

REFERENCES: VS70-942099 REV D EO DO1

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REPORT DATE 03/18/87

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 318	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
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: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[F]

LOCATION: F BAY 1, PCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16CR J2-79; 82V76A17CR J2-79

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

EFFECTS/RATIONALE:

LOSE ABILITY TO COMMAND FU & OX HE ISOL A/B VLVs CLOSED USING CREW SWITCH. GPC CAN STILL OPEN OR CLOSE VLVS. LOSS OF ALL REDUNDANCY IS POSSIBLE INABILITY TO ISOLATE HE SYSTEM LEADING TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 319	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/1R	RTLS: 3/1R
LIFTOFF: 3/1R	TAL: $3/1R$
ONORBIT: 3/1R	AOA: $3/1R$
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/1R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[F]
LOCATION: F BAY 1, PCA 1; F BAY PART NUMBER: 81V76A16CR J2-79; 82V	Y 2, LCA 2 /76A17CR J2-79
CAUSES: CONTAMINATION, VIBRATION, POVERLOAD	MECHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: LOSE ISOLATION BETWEEN GPC AND CREW FAILURE CAN RESULT IN LOSS OF THE C THE FULL OX HE ISOL A/B VLVS. LOSS	SPC OR CREW SWITCH TO OPERATE

THE FU & OX HE ISOL A/B VLVS. LOSS OF ALL REDUNDANCY IS POSSIBLE INABILITY TO ISOLATE HE SYSTEM LEADING TO OVERPRESSURIZATION OF PROP TANKS OR LINES, FIRE/HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 320	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)	SUBSYS LEAD: D.J. PAUL
CRITICAL	LITTES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $2/1R$
ONORBIT: 3/2R	AOA: $2/1R$
DEORBIT: 2/1R	ATO: $2/1R$
LANDING/SAFING: 3/3	·
REDUNDANCY SCREENS: A [2]	B[P] C[P]

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22CR37; 82V76A23CR8

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

EFFECTS/RATIONALE:

LOSE CREW SWITCH SIGNAL TO OPEN FU & OX HE ISOL A/B VLV. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS FAILED CLOSED CASE. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ABORTS AND DEORBIT, LOSS OF LIFE/VEHICLE.

DATE: SUBSYSTEM: F MDAC ID: 3	1/27/87 RCS 21	FL	ICALITY HDW/FUNC IGHT: 2/1R ORT: 2/1R
ITEM: FAILURE MODE:	DIODE FAILS SHORT		
LEAD ANALYST:	V.J. BURKEMPER	SUBSYS LEAD:	D.J. PAUL
2) CONTROLS	AL COMPONENTS		
	CRITICA	LTTTES	
	HASE HDW/FUNC	A BODT	HDW/FUNC
FLIGHT PH	HASE HDW/FUNC	RTLS: TAL:	2/1R
PRELAU	UNCH: 3/3	RILD.	2/1P
LIFTO	FF: 3/3	TAL:	2/1R
ONORB:	IT: 3/2R	AOA:	2/1R
DEORB	IT: 2/1R	ATO:	2/1R
TANDTI	NG/SAFING: 3/3		
	SCREENS: A [3]		С[Р]
PART NUMBER:	F BAY 1, PCA 1; F BAY 1, PCA 1; F BAY 1, PCA 1; F BAY 81V76A22CR37; 82V76A	ZJUNO	
CAUSES: CON	TAMINATION, VIBRATION,	MECHANICAL SH	OCK, THERMAL SHOCK,

OVERLOAD

EFFECTS/RATIONALE:

LOSE ISOLATION BETWEEN MAIN BUSES WHEN THE GPC CMDS THE FU & OX HE ISOL A/B VLVS OPEN. THE WORST CASE EFFECT IS LOSS OF THE GPC OR CREW SWITCH "OPEN" CMD. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS BECOMING STUCK IN THE CLOSED POSITION. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED FRCS PROPELLANTS CAUSING THE VEHICLE SAFETY CG BOUNDARIES TO BE EXCEEDED.

1/27/87 HIGHEST CRITICALITY HDW/FUNC DATE: SUBSYSTEM: FRCS FLIGHT: 2/1R MDAC ID: 322 ABORT: 2/1R ITEM: DIODE FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 TAL: PRELAUNCH: 2/1R LIFTOFF: 2/1R3/2R ONORBIT: AOA: 2/1R DEORBIT: 2/1R ATO: 2/1R LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22CR13; 82V76A23RPC38

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

EFFECTS/RATIONALE:

LOSE GPC COMMAND SIGNAL TO OPEN FU & OX HE ISOL A/B VLV. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS FAILED CLOSED CASE. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ABORTS AND DEORBIT, LOSS OF LIFE/VEHICLE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 323	HIGHEST CRITICALITY FLIGHT: ABORT:	HDW/FUNC 2/1R 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)		
CRITICA	LITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:2/1RLANDING/SAFING:3/3	ABORT HDW/FUN RTLS: 2/1R TAL: 2/1R AOA: 2/1R ATO: 2/1R	с
REDUNDANCY SCREENS: A [3]	B[P] C[P]	

LOCATION: F BAY 1, PCA 1; F BAY 2, PCA 2 PART NUMBER: 81V76A22CR13; 82V76A23RPC38

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

EFFECTS/RATIONALE:

LOSE ISOLATION BETWEEN MAIN BUSES WHEN THE CREW SWITCH CMDS THE FU & OX HE ISOL A/B VLVS OPEN. THE WORST CASE EFFECT IS LOSS OF THE GPC OR CREW SWITCH "OPEN" CMD. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS BECOMING STUCK IN THE CLOSED POSITION. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED FRCS PROPELLANTS CAUSING THE VEHICLE SAFETY CG BOUNDARIES TO BE EXCEEDED.

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DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:324ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 DS3 PART NUMBER: 33V73A8CR1; 82V76A17AR J4-55 TYPE II
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: LOSE THE FU & OX HE ISOL VLVS POSITION TALKBACK TO HARDWIRED CREW

INDICATOR. NO IMPACT, VALVE TALKBACK NOT MISSION CRITICAL.

DATE: 1/27/87 HI SUBSYSTEM: FRCS MDAC ID: 325	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: PNL 08 DS3 PART NUMBER: 33V73A8CR1; 82V76A17AR	
CAUSES: CONTAMINATION, VIBRATION, MEC OVERLOAD	CHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE	5.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 326	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	TTTRS
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ITIES ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	В[] С[]
LOCATION: PNL 08 DS3 PART NUMBER: 33V73A8CR2; 33V73A8CR	3
CAUSES: CONTAMINATION, VIBRATION, MI SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE THE FU HE ISOL VLVS POSITION TANDICATOR. NO IMPACT, VALVE TALKBA	ALKBACK TO HARDWIRED CREW CK NOT MISSION CRITICAL.

	HIGHEST CRITICALITY HDW/FUNC
DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 327	FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL O8 DS3 PART NUMBER: 33V73A8CR2; 33V73A8CR	23
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILA	BLE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 328	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAI	TTIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]

LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16AR J4-50 TYPE I; 82V76A17AR J4-50 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE ABILITY TO COMMAND FU & OX HE ISOL A/B VLVS CLOSED USING CREW SWITCH OR GPC. WORST CASE RESULTS IN HE ISOL A/B VLVS BECOMING STUCK IN THE OPEN POSITION. THEREFORE THE HE TK CANNOT BE ISOLATED FROM THE PROPELLANT SYSTEM, NO IMMEDIATE EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 329	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R	
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>		
CRITICA	LITIES	
FLIGHT PHASE HDW/FUNC		
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R	RTLS: 2/1R	
LIFTOFF: 3/3	TAL: $2/1R$	
ONORBIT: 3/2R	AOA: 2/1R	
ONORBIT: 3/2R DEORBIT: 2/1R	ATO: 2/1R	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [2]	B[P] C[P]	
LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16AR J4-50 TYPE I; 82V76A17AR J4-50 TYPE I		
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: LOSE CAPABILITY TO COMMAND FU & OX HE ISOL A/B VLVS USING GPC. CREW SWITCH CAN STILL OPEN OR CLOSE VLVS. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN FU & OX HE ISOL A/B VLVS BECOMING STUCK IN		

WORST CASE, RESULTS IN FU & OX HE ISOL A/B VLVS BECOMING STOCK IN THE CLOSED POSITION. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 330	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:2/1RTAL:2/1RAOA:2/1RATO:2/1R

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

LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16AR J4-51 TYPE I; 82V76A17AR J4-51 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND SIGNAL TO OPEN FU & OX HE ISOL A/B VLV. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS FAILED CLOSED CASE. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ABORTS AND DEORBIT, LOSS OF LIFE/VEHICLE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 331	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICA	I.TUTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R	ABORT HDW/FUNC
DRELAUNCH: 3/3	RTLS: 3/1R
I.IETOFF 3/1R	TAL: $3/1R$
	303· $3/1R$
DEORBIT: 3/1R	
LANDING/SAFING: 3/3	
Initial of the sys	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 1, LCA 1; F BA PART NUMBER: 81V76A16AR J4-51 TYP	Y 2, LCA 2 E I; 82V76A17AR J4-51 TYPE I
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE FU & OX INTO OPEN POSITION. THEREFORE THE FROM THE PROPELLANT SYSTEM, NO IMM REDUNDANCY IS POSSIBLE LOSS OF LIFT OVERPRESSURIZATION AND RUPTURE OF FIRE/EXPLOSION HAZARD, AND HAZARD T ZOTS.	HELIUM TK CANNOT BE ISOLATED EDIATE EFFECT. LOSS OF ALL E/VEHICLE DUE TO PROP TANKS OR LINES,

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 332	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: 2/1R
ONORBIT: 3/2R	AOA: $2/1R$
DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 2, LCA 2; F BAY PART NUMBER: 82V76A17AR J4-57 TYPE	2 3, LCA 3 2 I; 83V76A18R J1-92 (A)
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: LOSE CREW SWITCH SIGNAL TO OPEN FU	

LOSE CREW SWITCH SIGNAL TO OPEN FU & OX HE ISOL A/B VLV. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN BOTH A & B HE ISOL VLVS FAILED CLOSED CASE. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN TRAPPED PROPELLANTS CAUSING THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ABORTS AND DEORBIT, LOSS OF LIFE/VEHICLE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 333	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	LTTTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 2, LCA 2; F BA PART NUMBER: 82V76A17AR J4-57 TYP	Y 3, LCA 3 E I; 83V76A18R J1-92 (A)
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE FU & OX HE ISOL A/B VLV'S BECOMING STUCK INTO OPEN POSITION. THEREFORE THE HELIUM TK CANNOT BE ISOLATED FROM THE PROPELLANT SYSTEM, NO IMMEDIATE EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.	

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 334	HIGHEST CRITICALITY HDW/F FLIGHT: 3/3 ABORT: 3/3	UNC
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)		
CRITICAL	ITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3	
REDUNDANCY SCREENS: A [] E	3[] C[]	
LOCATION: F BAY 1, LCA 1; F BAY	2, LCA 2	

PART NUMBER: 81V76A16AR J4-53 TYPE II; 82V76A17AR J4-53 TYPE II

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

DUAL EFFECT: FIRST, FALSE INDICATION OF FU & OX HE ISOL A/B VLV MISMATCH (GPC HAS CORRECT POSITION); TALKBACK NOT MISSION CRTICAL. SECOND, LOSE CONTROL FEEDBACK TO REMOVE POWER FROM VLV ONCE IT HAS LATCHED; VALVE CAN WITHSTAND CONTINUOUS ENERGIZATION.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0420 REV C AMENDMENT SEQ 8

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DATE: 1/27/87 HIGH SUBSYSTEM: FRCS MDAC ID: 335	EST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER SUBSY	S LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASE HDW/FUNC ABO PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING (SAFING: 3/3	ORT 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	
HAIDING/DATING. 5/5	
REDUNDANCY SCREENS: A [2] B [F	[] C[P]
LOCATION: F BAY 1, LCA 1; F BAY 2, L PART NUMBER: 81V76A16AR J4-53 TYPE II;	CA 2 82V76A17AR J4-53 TYPE II
CAUSES: CONTAMINATION, VIBRATION, PIECE	PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: FAILURE RESULTS IN A FALSE CREW (BARBER) CLOSURE AND A FALSE CONTROL FEEDBACK WHI CREW SWITCH "CLOSE" COMMANDS. THE FAILUR TWO FU & OX HE ISOL (A OR B) VLV'S BECOM THE OPEN POSITION. THEREFORE THE HE TK CA PROPELLANT SYSTEM, NO IMMEDIATE EFFECT. POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVE POSSIBLE RUPPTURE OF PROP TANKS OR LINES FIRE/EXPLOSION HAZARD, AND HAZARD TO GROU	CH INHIBITS ALL GPC AND E CAN RESULT IN ONE OF THE ING STUCK IN ANNOT BE ISOLATED FROM THE LOSS OF ALL REDUNDANCY IS RPRESSURIZATION AND

FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 336	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	A10. 375
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: PNL 08 DS4 PART NUMBER: 81V76A16AR J4-55 TYPE	II; 33V73A8CR4
CAUSES: CONTAMINATION, VIBRATION, P	IECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: DUAL EFFECT: FIRST, FALSE INDICATION MISMATCH (GPC HAS CORRECT POSITION); CRTICAL. SECOND, LOSE CONTROL FEEDBA ONCE IT HAS LATCHED; VALVE CAN WITHS	TALKBACK NOT MISSION ACK TO REMOVE POWER FROM VLV

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 337	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R	
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)		
CRITICA	LITIES	
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R	
REDUNDANCY SCREENS: A [3]	B[F] C[P]	
LOCATION: PNL 08 DS4 PART NUMBER: 81V76A16AR J4-55 TYP		
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: FAILURE RESULTS IN A FALSE CREW (BARBER POLE) INDICATION OF VLV OPENING AND A FALSE CONTROL FEEDBACK WHICH INHIBITS ALL GPC AND CREW SWITCH "OPEN" COMMANDS. THE FAILURE CAN RESULT IN ONE OF THE TWO (A OR B) HE ISOL VALVES FAILING CLOSED CASE. FOR THIS CASE, LOSS OF ALL REDUNDANCY TO THE VALVES WILL CAUSE LOSS OF HE PRESSURIZATION CAPABILITY, WHICH WILL AFFECT ONORBIT OPERATIONS AND MAY CAUSE THE VEHICLE CG SAFETY BOUNDARIES TO BE EXCEEDED DURING ENTRY OR ABORTS DUE TO THE TRAPPED PROPELLANT'S WEIGHT.		

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 338	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R	
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)		
CRITICALI	TIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING (SAFINC: 3/2	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]	В[Р] С[Р]	
LOCATION: PNL 08 DS4 PART NUMBER: 81V76A16AR J4-52 TYPE I; 82V76A17AR J4-52 TYPE I		
CAUSES: CONTAMINATION, VIBRATION, P	IECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE:		

LOSE ABILITY TO COMMAND FU & OX HE ISOL A/B VLVS CLOSED USING CREW SWITCH OR GPC. WORST CASE RESULTS IN HE ISOL A/B VLVS BECOMING STUCK IN THE OPEN POSITION. THEREFORE THE HE TK CANNOT BE ISOLATED FROM THE PROPELLANT SYSTEM, NO IMMEDIATE EFFECT. LOSS OF ALL REDUNDANCY IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND RUPTURE OF PROP TANKS OR LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 339	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
1.1 FTOFF: $3/3$	TAL: 3/3
	AOA: 3/3
	ΔΤΟ: 3/3
LANDING/SAFING: 3/3	Alot 0,0
REDUNDANCY SCREENS: A [] B	6 [] c []
LOCATION: PNL 08 DS4 PART NUMBER: 81V76A16AR J4-52 TYPE	I; 82V76A17AR J4-52 TYPE I
CAUSES: CONTAMINATION, VIBRATION, F	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: LOSE CAPABILITY TO INHIBIT THE FU & CMD. THE INHIBIT FUNCTION IS USED F OF A FAILURED ON COMMAND. NO EFFECT	OR POWER SAVINGS AND IN CASE

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 340	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) FUSE, 1A 6) 7) 8) 9)	
CRITICA	LITIES
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: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[F]
TOCATTON: DNL OR SIG: DNL OR ST	17

LOCATION: PNL 08 S16; PNL 08 S17 PART NUMBER: 33V73A8F4; 33V73A8F23

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

EFFECTS/RATIONALE:

LOSE ABILITY TO COMMAND FU & OX HE ISOL A/B VLVs CLOSED USING CREW SWITCH. GPC CAN STILL OPEN OR CLOSE VLVS. LOSS OF ALL REDUNDANCY IS POSSIBLE INABILITY TO ISOLATE HE SYSTEM LEADING TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS OR LINES, FIRE/HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 341		CALITY HDW/FUNC SHT: 3/1R RT: 3/1R
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D	.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) FUSE, 1A 6) 7) 8) 9)		
CRITICA	LITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R	ABORT	HDW/FUNC
DEFLAINCH: 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] 0	:[P]
LOCATION: PNL 08 S16; PNL 08 S PART NUMBER: 33V73A8F13; 33V73A8F	17 28	
CAUSES: CONTAMINATION, VIBRATION, OVERLOAD	MECHANICAL SHOC	K, THERMAL SHOCK,
FFFECTS/RATIONALE:		

EFFECTS/RATIONALE: LOSE ALL BUT ONE COMMAND (A GPC OPEN CMD) TO OPERATE FU & OX HE ISOL A/B VLVS. THE FAILURE RESULTS IN EITHER A OR B HE ISOL VALVE FAILED OPEN. THE EFFECT IS POSSIBLE LOSS OF LIFE/VEHICLE DUE TO OVERPRESSURIZATION AND POSSIBLE RUPTURE OF PROP TANKS LINES, FIRE/EXPLOSION HAZARD, AND HAZARD TO GROUND CREW. MAY ALSO CAUSE ZOTS.

DATE: 1/27/87 HIGHEST C SUBSYSTEM: FRCS MDAC ID: 342	RITICALITY FLIGHT: ABORT:	
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEA	D: D.J. PAUI	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASEHDW/FUNCABORTPRELAUNCH:3/3RTLS:LIFTOFF:3/3TAL:ONORBIT:3/3AOA:DEORBIT:3/3ATO:LANDING/SAFING:3/3	3/3 3/3 3/3	2
REDUNDANCY SCREENS: A [] B []	с[]	
LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16R J1-86 TO J2-79 (A); 82 J2-79 (A)	V76A17R J1-	86 TO
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE FRCS HE PRESS VLV A/B POSITION TALKBACK TO GPC. NO IMPACT, VALVE POSITION TALKBACK NOT MISSION CRITICAL.		
REFERENCES: VS70-942099 REV D EO D01		

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 343 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
FLIGHT PHASEHDW/FORCHDW/FORCPRELAUNCH:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16R J1-86 TO J2-79 (A); 82V76A17R J1-86 TO J2- 79 (A)
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/27/87 FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 344 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 PRELAUNCH: RTLS: 3/3 3/3 3/3 LIFTOFF: TAL: AOA: ONORBIT: 3/3 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16R J1-86 TO J2-79 (B); 82V76A17R J1-86 TO J2-79 (B) CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

HIGHEST CRITICALITY HDW/FUNC 1/27/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 345 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3 CRITICALITIES ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16R J1-86 TO J2-79 (A); 82V76A17R J1-86 TO J2-79 (A) CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: LOSE FRCS HE PRESS VLV A/B POSITION TALKBACK TO GPC. NO IMPACT, VALVE POSITION TALKBACK NOT MISSION CRITICAL.

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 346	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	ITTES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 2, LCA 2; F BAY PART NUMBER: 82V76A17R J1-92 (A);	3, LCA 3 83V76A18AR J4-57 TYPE I
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	
EFFECTS/RATIONALE: LOSE FRCS HE PRESS VLV A/B POSITION VALVE POSITION TALKBACK NOT MISSION	TALKBACK TO GPC. NO IMPACT, CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 347	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	ABORT HDW/FUNC
DDFLAINCH 3/3	RTLS: 3/3
	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
LANDING/SAFING: 5/5	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 2, LCA 2; F BA PART NUMBER: 82V76A17R J1-92 (A);	Y 3, LCA 3 83V76A18AR J4-57 TYPE I
CAUSES: CONTAMINATION, VIBRATION, 1 OVERLOAD	MECHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILA	BLE.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87 C-249

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 348	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)		
CRITICAL	JTTES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFING: 2/2		
	ABORI HDW/FUNC	
	RTLS: 3/3	
	TAL: 3/3	
ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A []	в[] с[]	
LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16R J1-88; 82V76A17R J1-88 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE THE FU HE ISOL VLVS POSITION T VALVE TALKBACK NOT MISSION CRITICAL	ALKBACK TO GPC. NO IMPACT,	

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 349	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	ITIES
FITCHT DEASE HOW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: $3/3$
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, LCA 1; F BAY PART NUMBER: 81V76A16R J1-88; 82V7	Y 2, LCA 2 '6A17R J1-88
CAUSES: CONTAMINATION, VIBRATION, M OVERLOAD	AECHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILAN	BLE.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 350	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: F BAY 1, LCA 1; F BAY PART NUMBER: 81V76A16R J1-90; 82V76	2, LCA 2 A17R J1-90

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

EFFECTS/RATIONALE: LOSE THE FU HE ISOL VLVS POSITION TALKBACK TO GPC. NO IMPACT, VALVE TALKBACK NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 351	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	ITIES
FLICHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, LCA 1; F BAY PART NUMBER: 81V76A16R J1-90; 82V7	
CAUSES: CONTAMINATION, VIBRATION, M OVERLOAD	ECHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILAB	LE.

HIGHEST CRITICALITY HDW/FUNC 1/27/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 352 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM
4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, LCA 1; F BAY 2, LCA 2 PART NUMBER: 81V76A16R J1-91; 82V76A17R J1-91 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE:

LOSE THE OX HE ISOL VLVS POSITION TALKBACK TO GPC. NO IMPACT, VALVE TALKBACK NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 353	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER S	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	6 [] C []
LOCATION: F BAY 1, LCA 1; F BAY PART NUMBER: 81V76A16R J1-91; 82V76	2, LCA 2 Al7R J1-91
CAUSES: CONTAMINATION, VIBRATION, ME OVERLOAD	CHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE:	

NONE, SWITCH TALKBACK STILL AVAILABLE.

SUBSYSTEM: FRCS MDAC ID: 354 ITEM: RESISTOR, 5.1K 1/4W	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, LCA 1; F BAY PART NUMBER: 81V76A16R J1-89; 82V76	2, LCA 2 6A17R J1-89
CAUSES: CONTAMINATION, VIBRATION, ME SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE: LOSE THE OX HE ISOL VLVS POSITION TALKBACK TO GPC. NO IMPACT, VALVE TALKBACK NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 355	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAI	TTTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	ABORT HDW/FUNC
PRELAIINCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, LCA 1; F BAY PART NUMBER: 81V76A16R J1-89; 82V7	Y 2, LCA 2 76A17R J1-89
CAUSES: CONTAMINATION, VIBRATION, MOVERLOAD	MECHANICAL SHOCK, THERMAL SHOCK,

EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 356	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAL	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 1, LCA 1; F BAY PART NUMBER: 81V76A16R J1-104; 82V	
CAUSES: CONTAMINATION, VIBRATION, M OVERLOAD	ECHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: DUAL EFFECT: FIRST, FALSE INDICATIO INDICATE FU & OX HE ISOL VLV MISMAT VALVES STUCK PARTIALLY OPEN/PARTIAL MISSION CRITICAL	CH AND GPC WILL INDICATE BOTH

SECOND, LOSE CONTROL FEEDBACK TO REMOVE POWER FROM VALVE ONCE IT HAS LATCHED: VALVE CAN WITHSTAND CONTINUOUS ENERGIZATION.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0420 REV C AMENDMENT SEQ 8

DATE: 1/27/87 HIG SUBSYSTEM: FRCS MDAC ID: 357	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SUBS	SYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICALITIE	S
TTTCUT DUNCE HOW/FINC	BORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3
LIFTOFF: 3/3	TAL: 3/3
	AOA: 3/3
ONORBIT: 3/3	ATO: 3/3
DEORBIT: 3/3	A10. 5/5
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: F BAY 1, LCA 1; F BAY 2, PART NUMBER: 81V76A16R J2-104; 82V76A1	LCA 2 L7R J2-104
CAUSES: CONTAMINATION, VIBRATION, MECH	ANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE T CIRCUIT.	TO HYBRID DRIVER LOGIC

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 358	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: HE OX & FU ISOL FAILURE MODE: SWITCH FAILS IN T	VLV A OR B SWITCH THE OPEN POSITION
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B 6) 7) 8) 9)	
CRITI	ICALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/1R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING (SAFING: 3/1P	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]	В[Р] С[Р]
LOCATION: PNL 08 S16	
PART NUMBER: 33V73A8S16; S17	
CAUSES: CONTAMINATION, VIBRATION OVERLOAD	, MECHANICAL SHOCK, THERMAL SHOCK,
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE PRESS	URE REGULATOR AND THE PRESSURE

REDUNDANCY PROVIDED BY THE PRESSURE REGULATOR AND THE PRESSURE RELIEF VALVE. IF THE SWITCH FAILS IN THE OPEN POSITION WHILE THE VALVE IS IN ANY POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL RESULT IN THE OVERPRESSURIZATION AND RUPTURE OF THE PROPELLANT TANKS AND/OR LINES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 359	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: HE OX & FU ISOL VLV FAILURE MODE: SWITCH FAILS IN THE (A OR B SWITCH CLOSED POSITION		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH 6) 7) 8) 9)			
CRITICAL	ITTES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	ABORT HDW/FUNC		
DEFLAINCH 3/3	RTLS: 3/1R		
	TAT: 3/1R		
LIFTOFF: 5/5	303 $3/10$		
ONORBIT: 3/2R	AUA: J/IR		
DEORBIT: 3/1R	ATO: $3/1R$		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A [2]	B[P] C[P]		
LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17			
CAUSES: CONTAMINATION, VIBRATION, M OVERLOAD	ECHANICAL SHOCK, THERMAL SHOCK,		
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS AND THE PARALLEL ISOL VALVE. IF THE SWITCH FAILS IN THE CLOSED POSITION WHILE THE VALVE IS IN ANY POSITION, THE VALVE WILL CLOSE. IF THE MDM OPEN COMMAND IS ALSO PRESENT, OR THE SWITCH OPEN COMMAND IS ALSO PRESENT, THE VALVE WILL CYCLE OPEN AND CLOSED UNTIL THE MDM OR SWITCH OPEN COMMAND IS REMOVED, OR UNTIL THE CONTROL BUS POWER IS REMOVED FROM EITHER OF THE SWITCH'S CLOSE CONTACTS. TO OPEN THE VALVE, CREW MUST REMOVE POWER FROM EITHER OF THE SWITCH'S CLOSE CONTACTS 5,6, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPREATIONS, AND WILL CAUSE THE INABILITY TO EXPEL ENOUGH			

OPREATIONS, AND WILL CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE:	1/13/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS	FLIGHT:	3/1R
MDAC ID:	360	ABORT:	3/1R

ITEM: HE OX & FU ISOL VLV A OR B SWITCH FAILURE MODE: SWITCH FAILS IN THE GPC POSITION

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

- 1) ELECTRICAL COMPONENTS
- 2) CONTROLS
- 3) HE PRESS SUBSYSTEM
- 4) HE OX & FU ISOL A & B VLVS
- 5) HE OX & FU ISOL VLV A OR B SWITCH
- 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:	: 3/3		·

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

LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE PRESSURE REGULATOR AND THE PRESSURE RELIEF VALVE. TO OPERATE THE VALVE, THE CREW MUST USE THE GPC READ/WRITE PROCEDURES. IF THE VALVE IS CLOSED AND THE MDM OPEN COMMAND PATH FAILS, THE VALVE CANNOT BE OPENED BY THE MDM SWITCH COMMANDS. IF THE VALVE IS OPEN WHEN THE SWITCH FAILS, AND ALL REDUNDANCY FAILS, THE RESULT WILL BE OVERPRESSURIZATION AND RUPTURE OF THE PROPELLANT TANKS AND/OR LINES.

DATE: 1/13/87 H SUBSYSTEM: FRCS MDAC ID: 361	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3			
ITEM: HE OX & FU ISOL VLV A 2	OR B SWITCH OPEN CONTACTS 1,			
FAILURE MODE: SWITCH OPEN CONTACTS F.	AIL OPEN			
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)				
CRITICALIT	IES			
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC			
PRELAUNCH: 3/3	RTLS: 3/3			
LIFTOFF: 3/3	TAL: 3/3			
ONORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3			
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3			
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B	[] C[]			
LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE:				

NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 362	,		ITICALITY FLIGHT: ABORT:	3/3
ITEM: HE OX 2	& FU ISOL VLV	A OR B SWIT	CH OPEN CO	NTACTS 1,
FAILURE MODE: SWITCH	OPEN CONTACTS	FAIL CLOSE	D	
LEAD ANALYST: V.J. BU	RKEMPER	SUBSYS LEAD	: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)				
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC	ABORT	HDW/FUN	C
PRELAUNCH:	3/3	RTLS:	3/3	
ONOPRIT.	3/3	TAL:	3/3	
DEORBIT:	3/3	AUA:	3/3	
LANDING/SAFING	: 3/3	A10.	5/5	
REDUNDANCY SCREENS:	A []]	3[]	c []	
LOCATION: PNL 08 S PART NUMBER: 33V73A8	516 516; 517			
CAUSES: CONTAMINATIO OVERLOAD	N,VIBRATION, M	ECHANICAL SP	IOCK, THERI	MAL SHOCK,
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.				

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 363 ABORT: 3/3				
ITEM: HE OX & FU ISOL VLV A OR B SWITCH GPC CONTACTS 3, 4 FAILURE MODE: SWITCH GPC CONTACTS FAIL OPEN				
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL				
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH GPC CONTACTS 3, 4 6) 7) 8) 9)</pre>				
CRITICALITIES				
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3				
PRELAUNCH: 3/3 RTLS: 3/3				
LIFTOFF: 3/3 TAL: 3/3				
ONORBIT: 3/3 AOA: 3/3				
DEORBIT: 3/3 ATO: 3/3				
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.				

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:364ABORT:3/3				
ITEM: HE OX & FU ISOL VLV A OR B SWITCH GPC CONTACTS 3, 4 FAILURE MODE: SWITCH GPC CONTACTS FAIL CLOSED				
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH GPC CONTACTS 3, 4 6) 7) 8) 9)				
CRITICALITIES				
PRELAUNCH: 3/3 RTLS: 3/3				
LIFTOFF: 3/3 TAL: 3/3				
ONORBIT: 3/3 AOA: 3/3				
DEORBIT: 3/3 ATO: 3/3				
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.				

DATE: SUBSYSTEM: MDAC ID:	FRCS	7.		ITICALITY FLIGHT: ABORT:	
6		(& FU ISOL VL H CLOSE CONTAG		CH CLOSE C	ONTACTS 5,
LEAD ANALYS	T: V.J. BI	JRKEMPER	SUBSYS LEAD	: D.J. PAU	L
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH CLOSE CONTACTS 5, 6 6) 7) 8) 9)</pre>					
		CRITICA	AT.TTTES		
FLIGHT I PRELA LIFTO ONORI DEORI LAND	PHASE AUNCH: DFF: BIT: BIT: ING/SAFING	HDW/FUNC 3/1R 3/1R 3/1R 3/1R 3/1R	ABORT RTLS: TAL: AOA: ATO:	HDW/FUN 3/1R 3/1R 3/1R 3/1R 3/1R	С
REDUNDANCY	SCREENS:	A [2]	B [F]	C[P]	
LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17					

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM CLOSE COMMAND, THE PRESSURE REGULATOR, AND THE PRESSURE RELIEF VALVE. IF THE CLOSE CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE OPENED BY THE SWITCH OR BY THE MDM COMMAND, AND CANNOT BE CLOSED BY THE SWITCH COMMAND, ONLY BY THE MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL RESULT IN OVERPRESSURIZATION AND RUPTURE OF THE PROPELLANT TANKS AND/OR LINES.

DATE: SUBSYSTEM: MDAC ID:	FRCS		HIGHEST (CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
5,6		FU ISOL VLV CLOSE CONTAC		TCH CLOSE CO	ONTACTS
LEAD ANALYS	T: V.J. BUR	KEMPER	SUBSYS LE	AD: D.J. PAU	L
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH CLOSE CONTACTS 5, 6 6) 7) 8) 9)</pre>					
		CRITICA	LITIES		
FLIGHT PRELI LIFT ONORI DEORI LAND	PHASE 1 AUNCH: OFF: BIT: BIT: ING/SAFING:	HDW/FUNC 3/3 3/3 3/2R 3/1R 3/3	ABORT RTL TAL AOA ATO	HDW/FUN S: 3/1R : 3/1R : 3/1R : 3/1R : 3/1R	с
REDUNDANCY	SCREENS:	A [2]	B [P]	С[Р]	
LOCATION: PART NUMBER					
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD					
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS, THE OTHER SWITCH CLOSE CONTACTS, AND THE PARALLEL ISOL VALVE. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE GPC OR CLOSED POSITION, THE VALVE WILL CLOSE, AND CANNOT BE OPENED BY MDM COMMAND, ONLY BY SWITCH COMMAND. IF THE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE OPEN POSITION, THE VALVE WILL REMAIN OPEN, AND CANNOT BE CLOSE BY MDM COMMAND, ONLY BY SWITCH COMMAND. TO OPEN THE VALVE WITH THE MDM COMMAND, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CLOSE CONTACTS 5,6, AND USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROP DURING ENTRY AND ABORTS TO MEET THE CG SAFETY BOUNDARIES.					

HIGHEST CRITICALITY HDW/FUNC 1/13/87 DATE: FLIGHT: 3/1R SUBSYSTEM: FRCS 3/1R ABORT: MDAC ID: 367 HE OX & FU ISOL VLV A OR B SWITCH OPEN CONTACTS 7, ITEM: 8 FAILURE MODE: SWITCH OPEN CONTACTS FAIL OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: ELECTRICAL COMPONENTS 1) CONTROLS 2) 3) HE PRESS SUBSYSTEM HE OX & FU ISOL A & B VLVS 4) 5) HE OX & FU ISOL VLV A OR B SWITCH OPEN CONTACTS 7, 8 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE

 3/3
 RTLS:
 3/1R

 3/3
 TAL:
 3/1R

 3/2R
 AOA:
 3/1R

 PRELAUNCH: LIFTOFF: ONORBIT: ATO: 3/1R 3/1R DEORBIT: LANDING/SAFING: 3/1R REDUNDANCY SCREENS: A [2] B [F] C [P] LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS AND THE PARALLEL ISOL VALVE. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE CLOSED BY SWITCH OR MDM COMMAND, BUT CANNOT BE OPENED BY SWITCH COMMAND, ONLY BY MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, AND MAY RESULT IN THE INABILITY TO EXPEL ENOUGH PROPELLANT DURING ENTRY AND ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 368	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R			
ITEM: HE OX & FU ISC 8	OL VLV A OR B SWITCH OPEN CONTACTS 7,			
FAILURE MODE: SWITCH OPEN CO	NTACTS FAIL CLOSED			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH OPEN CONTACTS 7, 8 6) 7) 8) 9)				
CR	ITICALITIES			
FLIGHT PHASE HDW/FUN	C ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R			
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 O8 S16				
PART NUMBER: 33V73A8S16; S17				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE PRESSURE REGULATOR AND THE PRESSURE RELIEF VALVE. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE OPEN OR GPC POSITION, THE VALVE WILL OPEN. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE CLOSED POSITION, OR IF THE MDM CLOSE COMMAND IS ALSO PRESENT, THE VALVE WILL CYCLE OPEN AND CLOSED UNTIL CONTROL BUS POWER TO THE OPEN OR CLOSE CONTACTS IS REMOVED, OR UNTIL THE MDM CLOSE COMMAND IS REMOVED.				

FAILURE OF ALL REDUNDANCY WILL RESULT IN THE OVERPRESSURIZATION AND RUPTURE OF THE PROPELLANT TANKS AND/OR LINES.

HIGHEST CRITICALITY HDW/FUNC 1/13/87 DATE: 3/3 FLIGHT: SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 369 HE OX & FU ISOL VLV A OR B SWITCH GPC CONTACTS 9, ITEM: 10 FAILURE MODE: SWITCH GPC CONTACTS FAIL OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: ELECTRICAL COMPONENTS 1) CONTROLS 2) 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH GPC CONTACTS 9, 10 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 FLIGHT PHASE PRELAUNCH: LIFTOFF: AOA: 3/3 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMAND AND THE PARALLEL ISOLATION VALVE. IF THE GPC CONTACTS FAIL OPEN, THE VALVE CAN BE OPENED BY SWITCH OR MDM COMMAND, CAN BE CLOSED BY SWITCH COMMAND, AND CANNOT BE CLOSED BY MDM COMMAND UNLESS THE SWITCH IS IN THE CLOSED POSITION. FAILURE OF ALL REDUNDANCY WILL RESULT IN LOSS OF GPC CONTROL OF THE HELIUM PRESSURE.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 370	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R			
ITEM: HE OX & FU ISOL VLV 10 FAILURE MODE: SWITCH GPC CONTACTS				
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH GPC CONTACTS 9, 10 6) 7) 8) 9)				
CRITICAL	LITIES			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	ABORT HOW/FILMO			
PRELAUNCH: 3/3	RTIS: 3/1P			
LIFTOFF: 3/3	TAL: 3/10			
ONORBIT: 3/2R	$\lambda \Omega \lambda + 3/1P$			
DEORBIT: 3/1P	λ λ Π Ο· 2/1 Γ			
LANDING/SAFING: 3/3	AIO. J/IR			
REDUNDANCY SCREENS: A [3]	B[F] C[P]			
LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17				
CAUSES: CONTAMINATION, VIBRATION, M OVERLOAD	MECHANICAL SHOCK, THERMAL SHOCK ,			
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE OTHER CLOSE CONTACTS AND THE SWITCH AND MDM OPEN COMMAND. FIRST FAILURE WILL HAVE NO EFFECT. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO THE OPEN VALVE, WHICH				

WILL AFFECT ONORBIT OPERATIONS AND MAY CAUSE THE

INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ENTRY OR ABORTS TO MEET THE CG SAFETY BOUNDARIES.

HIGHEST CRITICALITY HDW/FUNC 1/13/87 DATE: FLIGHT: 3/1R SUBSYSTEM: FRCS 3/1R ABORT: MDAC ID: 371 HE OX & FU ISOL VLV A OR B SWITCH CLOSE CONTACTS ITEM: 11, 12 FAILURE MODE: SWITCH CLOSE CONTACTS FAIL OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: ELECTRICAL COMPONENTS 1) CONTROLS 2) 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH CLOSE CONTACTS 11, 12 6) 7) 8) 9) CRITICALITIES FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/1RRTLS:3/1RLIFTOFF:3/1RTAL:3/1RONORBIT:3/1RAOA:3/1RDEORBIT:3/1RATO:3/1R 3/1R DEORBIT: LANDING/SAFING: 3/1R REDUNDANCY SCREENS: A [2] B [F] C [P] LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE SWITCH GPC CONTACTS AND THE MDM CLOSE COMMAND, AND BY THE PRESSURE REGULATORS AND THE PRESSURE RELIEF VALVE. IF THE CLOSE CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE OPENED BY THE SWITCH OR MDM COMMAND, BUT CANNOT BE CLOSED BY THE SWITCH OR MDM CLOSE COMMAND. THE VALVE CAN BE CLOSED BY PLACING THE SWITCH IN THE GPC POSITION, AND THEN USING THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL RESULT IN THE OVERPRESSURIZATION AND RUPTURE OF THE PROPELLANT TANKS AND/OR LINES.

DATE: 1/13/8 SUBSYSTEM: FRCS MDAC ID: 372	7	HIGHEST	CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM: HE O. 11, 12	X & FU ISOL VL	V A OR B SWI	TCH CLOSE CO	ONTACTS
FAILURE MODE: SWITC	H CLOSE CONTAC	TS FAIL CL	OSED	
LEAD ANALYST: V.J. B	URKEMPER	SUBSYS LE	AD: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH CLOSE CONTACTS 11, 12 6) 7) 8) 9)				
	CRITICA	LITIES		
FLIGHT PHASE	HDW/FUNC 3/3 3/3 3/2R 3/1R	ABORT	HDW/FUN	C
PRELAUNCH:	3/3	RTL	3/1R	•
LIFTOFF:	3/3	TAL:	3/1R	
ONORBIT:	3/2R	AOA:	5: 3/1R 3/1R 3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING	G: 3/3		-,	
REDUNDANCY SCREENS:	A [3]	B [F]	C [P]	
LOCATION: PNL 08 S16 PART NUMBER: 33V73A8S16; S17				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE OTHER SWITCH CLOSE CONTACTS AND THE PARALLEL ISOL VALVE. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, AND CAN BE CLOSED AND OPENED BY SWITCH OR MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ENTRY OR ABORTS TO MEET THE CG SAFETY BOUNDARIES.

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 373 HE TK PRESS-2 PRESS SENSOR ITEM: FAILURE MODE: INDICATES LOWER PRESSURE THAN ACTUAL LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE TK PRESS-2 PRESS 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 ONORBIT: DEORBIT: ATO: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT6 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA. REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

DATE: 1/19/87 HI SUBSYSTEM: FRCS MDAC ID: 374	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3			
ITEM: HE TK PRESS-2 PRESS SEN FAILURE MODE: INDICATES HIGHER PRESSU	ISOR JRE THAN ACTUAL			
LEAD ANALYST: V.J. BURKEMPER SUI	BSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE TK PRESS-2 PRESS SENSOR 6) 7) 8) 9)				
CRITICALITI	ES			
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC			
PRELAUNCH: 3/3	RTLS: 3/3			
LIFTOFF: 3/3	TAL: 3/3			
ONORBIT: 3/3	AOA: 3/3			
DEORBIT: 3/3	ATO: 3/3			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] c []			
LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT6				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD				

DECISION BASED ON ERRONEOUS DATA.

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

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HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: 3/3 FLIGHT: SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 375 HE FU TK PRESS-1 PRESS SENSOR ITEM: FAILURE MODE: INDICATES LOWER PRESSURE THAN ACTUAL LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE FU TK PRESS-1 PRESS SENSOR 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 PRELAUNCH: 3/3 TAL: 3/3 3/3 LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] FWD FUSELAGE AREA 20 LOCATION: PART NUMBER: 22V42MT5 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA. REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE

SYSTEMS HANDBOOK, PAGE 11.6

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 376	HIGHEST (CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: HE FU TK PRE FAILURE MODE: INDICATES HI	ISS-1 PRESS SENSOR IGHER PRESSURE THAI	N ACTUAL		
LEAD ANALYST: V.J. BURKEMPH	R SUBSYS LE	AD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE FU TK PRESS-1 PRESS 6) 7) 8) 9)	SENSOR			
	CRITICALITIES			
FLIGHT PHASE HDW/F PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	UNC ABORT RTLS TAL: AOA: ATO:	HDW/FUNC : 3/3 3/3 3/3 3/3		
REDUNDANCY SCREENS: A [] В[]	c []		
LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT5				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.				
REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6				

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HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 377 HE OX TK PRESS-1 PRESS SENSOR ITEM: FAILURE MODE: INDICATES LOWER PRESSURE THAN ACTUAL LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS INSTRUMENTATION 2) 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE OX TK PRESS-1 PRESS SENSOR 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 3/3 AOA: 3/3 CRITICALITIES FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT3 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL

SHOCK, OVERLOAD

EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

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DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 378		F	TICALITY HDW/FUNG LIGHT: 3/3 BORT: 3/3	2
ITEM: HE OX TK PRESS-1 PRESS SENSOR FAILURE MODE: INDICATES HIGHER PRESSURE THAN ACTUAL				
LEAD ANALYST: V.J. BUF	KEMPER	SUBSYS LEAD:	D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE OX TK PRESS-1 PRESS SENSOR 6) 7) 8) 9)				
	CRITICAL	TIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS: TAL: AOA:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3 3/3	ATO:	3/3	
REDUNDANCY SCREENS:		3[]	c []	
LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT3				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.				
REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6				

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 379 HE OX TK PRESS-2 PRESS SENSOR ITEM: FAILURE MODE: INDICATES LOWER PRESSURE THAN ACTUAL LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS INSTRUMENTATION 2) 3) HE PRESS SUBSYSTEM 4) HE TK HE OX TK PRESS-2 PRESS SENSOR 5) 6) 7) 8) 9) CRITICALITIES CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT4 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA. REFERENCES: VS70-942099 REV D EO D01; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

DATE:1/19/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:380ABORT:3/3				
ITEM: HE OX TK PRESS-2 PRESS SENSOR FAILURE MODE: INDICATES HIGHER PRESSURE THAN ACTUAL				
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE OX TK PRESS-2 PRESS 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: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT4				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: FAILURE OF TANK PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.				
REFERENCES: VS70-942099 REV D EO DOl; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6				

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 381 HE OX TK TEMP-1 TEMP SENSOR ITEM: FAILURE MODE: INDICATES LOWER TEMPERATURE THAN ACTUAL LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE OX TK TEMP-1 TEMP SENSOR 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 3/3 AOA: 3/3 FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C []

LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT15

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

EFFECTS/RATIONALE:

FAILURE OF TANK TEMPERATURE SENSOR AND REDUNDANT PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 382	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3					
ITEM: HE OX TK TEMP-1 TEMP SENSOR FAILURE MODE: INDICATES HIGHER TEMPERATURE THAN ACTUAL						
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL					
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE OX TK TEMP-1 TEMP SENSOR 6) 7) 8) 9)						
CRITICALITIES						
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3					
REDUNDANCY SCREENS: A []	B[] C[]					

LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT15

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

EFFECTS/RATIONALE:

FAILURE OF TANK TEMPERATURE SENSOR AND REDUNDANT PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 383	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: HE OX TK TEMP-1 TEM FAILURE MODE: INDICATES LOWER TEM	P SENSOR PERATURE THAN ACTUAL
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE OX TK TEMP-1 TEMP SENSOR 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: FWD FUSELAGE AREA 20	I

PART NUMBER: 22V42MT1

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

EFFECTS/RATIONALE:

FAILURE OF TANK TEMPERATURE SENSOR AND REDUNDANT PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 384	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: HE OX TK TEMP-1 TEMP FAILURE MODE: INDICATES HIGHER TEM	SENSOR PERATURE THAN ACTUAL	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE OX TK TEMP-1 TEMP SENSOR 6) 7) 8) 9)		
CRITICAL	ITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFING: 3/2	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
LIFTOFF: 3/3	TAL: 3/3	
ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [] E	3[] C[]	
LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT1		
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE:		

FAILURE OF TANK TEMPERATURE SENSOR AND REDUNDANT PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 385 HE FU TK TEMP-1 TEMP SENSOR ITEM: FAILURE MODE: INDICATES LOWER TEMPERATURE THAN ACTUAL LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE FU TK TEMP-1 TEMP 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 2/3 3/3 3/3 AOA: ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C []

LOCATION: FWD FUSELAGE AREA 20 PART NUMBER: 22V42MT2

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

EFFECTS/RATIONALE:

FAILURE OF TANK TEMPERATURE SENSOR AND REDUNDANT PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

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DATE:1/19/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:386ABORT:3/3		
ITEM: HE FU TK TEMP-1 TEMP SENSOR FAILURE MODE: INDICATES HIGHER TEMPERATURE THAN ACTUAL		
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE TK 5) HE FU TK TEMP-1 TEMP SENSOR 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3		
REDUNDANCY SCREENS: A [] B [] C [] LOCATION: FWD FUSELAGE AREA 20		
PART NUMBER: 22V42MT2 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: FAILURE OF TANK TEMPERATURE SENSOR AND REDUNDANT PRESSURE SENSORS WILL CAUSE GROUND AND FLIGHT CREW DIFFICULTY IN DETECTING A TANK LEAK. CREW MAY MAKE BAD DECISION BASED ON ERRONEOUS DATA.		
REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6		

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 387	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: HE OX & FU ISOL VLV FAILURE MODE: ERRONEOUS INDICATION MIDTRAVEL)	A OR B SWITCH TALKBACK V (FAILS HIGH, FAILS LOW, FAILS		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) INSTRUMENTATION 3) HE PRESS SUBSYSTEM 4) HE OX & FU ISOL A & B VLVS 5) HE OX & FU ISOL VLV A OR B SWITCH TALKBACK 6) 7) 8) 9)			
CRITICAI	LITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/1R		
LIFTOFF: 3/3	TAL: 3/1R		
ONORBIT: 3/2R	AOA: 3/1R		
DEORBIT: 3/1R	ATO: 3/1R		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A [2]	B[P] C[P]		
LOCATION: PNL 08 DS3, DS4 PART NUMBER: 33V73A8DS3; DS4			
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD			
EFFECTS/RATIONALE: FWD RCS HE PRESS A/B POSITION INDICATION WOULD FALSELY SHOW A BARBERPOLE INDICATING EITHER THE FU OR OX A OR B VALVES ARE STUCK PARTIALLY OPEN/CLOSED OR THERE IS A POSITION MISMATCH BETWEEN THE TWO VALVES. LOSS OF ALL REDUNDANCY WOULD RESULT			

IN LOSS OF DIRECT VALVE TALKBACK TO CREW. WORST CASE WOULD BE FALSELY FAILING THE A OR B VALVE CLOSED RESULTING IN LOSS OF MISSION DUE TO SAFETY CONSIDERATIONS (ONE FAILURE AWAY FROM LOSS OF VEHICLE/LIFE).

REFERENCES: VS70-942099 REV D EO DO1; JSC 11174, SPACE SHUTTLE SYSTEMS HANDBOOK, PAGE 11.6

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 388	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITI	CALITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR4	

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU TK ISOL 1/2 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

REFERENCES: VS70-942099 REV D EO DO1; MC482-0430 REV E AMENDMENT SEQ. 7

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 389	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3	RTLS: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3 ATO: 3/3
DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 375
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR4	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CONT SWITCH IS PLACED IN THE CLOSE POSIT POSSIBLE CURRENT FLOW WILL BE LIMIT	PION. NO EFFECT ON MIDDION/

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 390	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	SUBSYS LEAD: D.J. PAUL
CRITICALI	THT FC
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]] LOCATION: F BAY 3A, MCA 3	B[P] C[P]
PART NUMBER: 83V76A113A1CR21	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU ISOL 1/2 VALVE USING CREW SWITCH. THE VALVE IS STILL FULLY OPERATIONAL USING GPC CMDS. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS ABORTS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 391	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
COTUTCI	ALITIES
	ABORT HDW/FUNC
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING (SAFING: 3/3	DTLS: 2/1R
FLIGHT PHASE HDW/FORC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	
LIFTOFF: 3/3	3/1R
ONORBIT: 3/1R	
DEODBIT: 3/1R	ATO: 3/1K
TANDING (SAFING: 3/3	
LANDING/SATING.	
REDUNDANCY SCREENS: A [3]	В[Р] С[Р]
LOCATION: F BAY 3A, MCA 3	
LOCATION: F BAI SA, MON S	
PART NUMBER: 83V76A113A1CR21	
CAUSES: CONTAMINATION, VIBRATION SHOCK, OVERLOAD	, MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "OPEN" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 1/2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVE FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.	

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 392	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	SUBSYS LEAD: D.J. PAUL
CRITICAI FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	LITIES ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR23

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU ISOL 1/2 VALVE USING CREW SWITCH. THE VALVE IS STILL FULLY OPERATIONAL USING GPC CMDS. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS ABORTS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 393	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: 3/1R
ONORBIT: 3/1R	AOA: 3/1R
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR23	

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "OPEN" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 1/2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVE FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 394	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALI	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
ONORBIT: 3/3	TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	(] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR3	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE OX TK ISOL 1/2 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 395	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: DIODE FAILURE MODE: FAILS SHORT	SUBSYS LEAD: D.J. PAUL
LEAD ANALYST: V.J. BURKEMPER BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	SUBSID LEADT DICT THEE
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:2/1RDEORBIT:2/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [3]	B[F] C[P]
LOCATION: F BAY 3A, MCA 3	

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR3

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN FU & OX CONTROL FEEDBACKS. CONTROL FEEDBACKS INHIBIT VALVE OPERATION AFTER COMMAND HAS BEEN COMPLETED. THE FAILURE CAN RESULT IN THE OX ISOL 1/2 VALVE FAILING MIDTRAVEL WHEN COMMANDED OPEN. THE EFFECT WOULD BE LOSS OF EIGHT PRIMARY JETS CAUSING AN INABILITY TO COMPLETE TIME CRITICAL DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 396	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: DIODE FAILURE MODE: FAILS OPEN			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)			
CRITICAL	LITIES		
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3		
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3		
DEORBIT: 3/3	AOA: 3/3 ATO: 3/3		
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	AIO: 3/3		
REDUNDANCY SCREENS: A []	в[] с[]		
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR1			
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: LOSE ABILITY TO CLOSE FU & OX TK ISOL 1/2 VALVES USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 1/2 AND MANIFOLD ISOL 1&2 VALVES BECOMING			

RESULTS IN THE TK ISOL 1/2 AND MANIFOLD ISOL 1&2 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 397			TICALITY LIGHT: BORT:	
ITEM: DIODE FAILURE MODE: FAILS SI	HORT			
LEAD ANALYST: V.J. BUR	KEMPER	SUBSYS LEAD:	D.J. PAUI	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONI 2) CONTROLS 3) PROP STOR & DIST S 4) OX & FU TK ISOL VI 5) DIODE 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAL	TTTES		
PRELAUNCH: LIFTOFF: ONORBIT:	HDW/FUNC 3/3 3/3 3/1R 3/1R 3/1R			2
REDUNDANCY SCREENS:	A [3]	B [P]	С[Р]	

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR1

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "CLOSE" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 1/2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVE FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 398	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR22

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU ISOL 1/2 VALVE USING GPC CMDS. THE VALVE IS STILL FULLY OPERATIONAL USING CREW SWITCH. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS ABORTS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 399	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)		
CRITICA	LITIES	
FLICHT PHASE HDW/FUNC	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 2/1R	
LIFTOFF: 3/3	TAL: $3/1R$	
ONORBIT: 3/1R	AOA: $3/1R$	
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	ATO: 3/IR	
REDUNDANCY SCREENS: A [3]	B[P] C[P]	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR22		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "OPEN" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 1/2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVE FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.		

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 400	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:2/1RTAL:3/1RAOA:3/1RATO:3/1R
REDUNDANCY SCREENS: A [3]	3[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR24	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN OX ISOL 1/2 VALVE USING GPC CMDS. THE VALVE IS STILL FULLY OPERATIONAL USING CREW SWITCH. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS ABORTS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 401	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
CRITICAL FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R PROPRIME 2/1P	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $3/1R$
ONORBIT: 3/1R	AOA: $3/1R$
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR24	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "OPEN" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 1/2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVE FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 402	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALI	TIES
	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CP2	

PART NUMBER: 83V76A113A1CR2

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE FU & OX TK ISOL 1/2 VALVES USING GPC COMMANDS. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 1/2 AND MANIFOLD ISOL 1&2 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 403	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR2	

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "CLOSE" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 1/2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVE FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 404	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAI	TTTT
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	A10. 5/5
REDUNDANCY SCREENS: A []	В[] С[]
LOCATION: F BAY 3A, MCA 3	
PART NUMBER: 83V76A113A1CR18	
CAUSES: CONTAMINATION, VIBRATION, 1 SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ABILITY TO CLOSE FU TK ISOL 1/2 GPC COMMANDS ARE STILL AVAILABLE. IN THE TK ISOL 1/2 AND MANIFOLD ISOI THE OPEN POSITION. THE EFFECT WOUL INABILITY TO ISOLATE THE TANKS FROM IMPACT.	LOSS OF ALL REDUNDANCY RESULTS L 1&2 VALVES BECOMING STUCK IN D BE AN

DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:405ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR18
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "CLOSE" CMDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF ABILITY TO CLOSE FU & OX TK ISOL 1/2 VALVES USING CREW SWITCH OR GPC. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND MANIFOLD ISOL 1 OR 2 BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 406	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: DIODE FAILURE MODE: FAILS OPEN			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: 3/3		
ONORBIT: 3/3	AOA: 3/3		
DEORBIT: 3/3	ATO: 3/3		
LANDING/SAFING: 3/3	•		
REDUNDANCY SCREENS: A []	в[] с[]		
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR31			
CAUSES: CONTAMINATION, VIBRATION, I SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL		

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU TK ISOL 1/2 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 407	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	LTTIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR31 CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CONT SWITCH IS PLACED IN THE OPEN POSIT POSSIBLE CURRENT FLOW WILL BE LIMI	BUS CA1 AND MNC WHEN THE CREW ION. NO EFFECT ON MISSION, ANY

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 408	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALIT	
	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B [[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR25	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE FU TK ISOL 1/2 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 409	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR25	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN FU & O	X CONTROL FEEDBACKS. CONTROL

LOSE DIODE ISOLATION BETWEEN FU & OX CONTROL FEEDBACKS. CONTROL FEEDBACKS INHIBIT VALVE OPERATION AFTER COMMAND HAS BEEN COMPLETED. THE FAILURE CAN RESULT IN THE OX ISOL 1/2 VALVE FAILING MIDTRAVEL WHEN COMMANDED CLOSED. THE EFFECT COULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:410ABORT:3/3	
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)</pre>	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR6	

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU TK ISOL 1/2 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 411	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR6	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CONT BUS CA1 AND MNC WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION. NO EFFECT ON MISSION, ANY POSSIBLE CURRENT FLOW WILL BE LIMITED BY SERIES RESISTANCE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 412	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR5	
CAUSES: CONTAMINATION, VIBRATION, I SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE:	

LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE FU TK ISOL 1/2 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 413	HIGHEST CRITICALITY HI FLIGHT: ABORT:	W/FUNC 2/1R 1/1
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)		
CRITICAL	LITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:2/1RDEORBIT:2/1RLANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:1/1TAL:2/1RAOA:2/1RATO:2/1R	
REDUNDANCY SCREENS: A [3]	B[F] C[P]	
LOCATION: F BAY 3A, MCA 3		

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR5

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN FU & OX CONTROL FEEDBACKS. CONTROL FEEDBACKS INHIBIT VALVE OPERATION AFTER COMMAND HAS BEEN COMPLETED. THE FAILURE CAN RESULT IN THE FU ISOL 1/2 VALVE FAILING MIDTRAVEL WHEN COMMANDED OPEN. THE EFFECT WOULD BE LOSS OF EIGHT PRIMARY JETS CAUSING AN INABILITY TO COMPLETE TIME CRITICAL DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES.

DATE: 1/27/87 HIGHEST CRITICAL SUBSYSTEM: FRCS FLIGH MDAC ID: 414 ABORT	I: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J.	PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDWPRELAUNCH:3/3RTLS:3LIFTOFF:3/3TAL:3ONORBIT:3/3AOA:3DEORBIT:3/3ATO:3LANDING/SAFING:3/33/3	/FUNC
PRELAUNCH: 3/3 RTLS: 3	3/3
LIFTOFF: 3/3 TAL: 3	3/3
ONORBIT: 3/3 AOA: 3	3/3
DEORBIT: 3/3 ATO: 3	1/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR17	
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, SHOCK, OVERLOAD	THERMAL

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE FU TK ISOL 1/2 VALVES USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 1/2 AND MANIFOLD ISOL 1&2 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

REFERENCES: VS70-942099 REV D EO DO1

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DATE: 1/27/87 HIGH SUBSYSTEM: FRCS MDAC ID: 415	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SUBS	YS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALITIE	S
FLIGHT PHASE HDW/FUNC A PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	BORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
	TAL: 3/3
	AOA: 3/3
ONORBIT: 3/3	ATO: 3/3
DEORBIT: 3/3	R10. 070
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR17	
CAUSES: CONTAMINATION, VIBRATION, MECH SHOCK, OVERLOAD	IANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC AND CI FAILURE COULD POSSIBLY RESULT IN LOSS O TK ISOL 1/2 VALVES USING CREW SWITCH OF REDUNDANCY RESULTS IN TK ISOL 1/2 AND M BECOMING STUCK IN THE OPEN POSITION. T	R GPC. LOSS OF ALL MANIFOLD ISOL 1 OR 2

BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 416 ITEM: DIODE	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	•
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 3A, MCA 3	
PART NUMBER: 83V76A113A1CR19	
CAUSES: CONTAMINATION, VIBRATION, N	AECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE ABILITY TO CLOSE OX TK ISOL 1/2 VALVES USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 1/2 AND MANIFOLD ISOL 1&2 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 417	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAI	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR19	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE FU TK ISOL 1/2 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 1 OR 2 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE:1/27/87HIGHEST CRITICALITYHDW/FUSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:418ABORT:3/3	NC
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3	
LIFTOFF: 3/3 TAL: 3/3	
ONORBIT: 3/3 AOA: 3/3	
DEORBIT: 3/3 ATO: 3/3	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR26	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE OX TK ISOL 1/2 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 419	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR26	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN FU & OX CONTROL FEEDBACKS. CONTROL FEEDBACKS INHIBIT VALVE OPERATION AFTER COMMAND HAS BEEN COMPLETED. THE FAILURE CAN RESULT IN THE FU ISOL 1/2 VALVE FAILING MIDTRAVEL WHEN COMMANDED CLOSED. THE EFFECT COULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE:1/27/87HIGHEST CRITICALITY HDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:420ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR32
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE CONTROL FEEDBACK FROM OX TK ISOL 1/2 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 421	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	В[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR32	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CONT BUS CA2 AND MNC WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION. NO EFFECT ON MISSION, ANY POSSIBLE CURRENT FLOW WILL BE LIMITED BY SERIES RESISTANCE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 422	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)		
CRITICALI	ITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3	
LIFTOFF: 3/3	TAL: 3/3	
ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [] E	3 [] C []	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR20		
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE ABILITY TO CLOSE OX TK ISOL 1/2 VALVES USING GPC COMMANDS. CREW SWITCH IS STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 1/2 AND MANIFOLD ISOL 1&2 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN		

INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 1 OR 2, NO MISSION IMPACT.

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 423	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER ST	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DIODE 6) 7) 8) 9)	
CRITICALI	FIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R	$\frac{1}{1}$
ONORBIT: 3/1R	ADA: $3/1R$
DEORBIT: 3/1R LANDING/SAFING: 3/3	A10: 5/1K
REDUNDANCY SCREENS: A [3]	3[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR20	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC AND FAILURE COULD POSSIBLY RESULT IN LOS	CREW SWITCH "OPEN" COMMANDS. S OF GPC OR CREW SWITCH TO

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH OTHER CONTROL FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 1/2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVE FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 424	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICALIT	IES
	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B ([] c []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR25	

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU TK ISOL 3/4/5 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0430 REV E AMENDMENT SEQ. 7

DATE: 1/27/87 1 SUBSYSTEM: FRCS MDAC ID: 425	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)</pre>	
CRITICALI	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] c []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR25	
CAUSES: CONTAMINATION, VIBRATION, MI SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEEN CONT BUS ABLAND MNA WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION. NO EFFECT ON MISSION, ANY POSSIBLE CURRENT FLOW WILL BE LIMITED BY SERIES RESISTANCE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 426	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOOMTON. E BAY I NON I	

LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76AlllAlCR26

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU ISOL 3/4/5 VALVE USING CREW SWITCH. THE VALVE IS STILL FULLY OPERATIONAL USING GPC CMDS. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

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ORBITER SUBSISIEM IL	
DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 427	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITIC	ALITIES
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R	ABORT HDW/FUNC
FLIGHT PHASE HDW/ICHC	RTLS: 2/1R
PRELAUNCH: 3/3	TAL: 3/1R
LIFTOFF: 3/3	3/1R
ONORBIT: 3/1R	ATO: 3/1R
	A10: 0/
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR26	
CAUSES: CONTAMINATION, VIBRATION SHOCK, OVERLOAD	, MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC FAILURE COULD POSSIBLY RESULT IN CONTROL OX & FU TK ISOL 3/4/5 VAN REDUNDANCY, WORST CASE, RESULTS IN VALVES FAILED CLOSED. THE EFFECT PROPELLANTS CONSEQUENTLY CG SAFET DURING RTLS RESULTING IN LOSS OF	LVE OPERATION. LOSS OF ALL IN TK ISOL 1/2 AND 3/4/5 IN INABILITY TO DEPLETE/USE IN BOUNDARIES WILL BE EXCEEDED
REFERENCES: VS70-942099 REV D E	0 D01

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 428	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY:	
1) ELECTRICAL COMPONENTS	
2) CONTROLS	
3) PROP STOR & DIST SUBSYSTEM	
4) OX & FU TK ISOL VLV 3/4/5	

- L VLV 3/4/5 5) DIODE
- 6)
- 7)

- 8)
- 9)

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

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

LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR27

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU ISOL 3/4/5 VALVE USING CREW SWITCH. THE VALVE IS STILL FULLY OPERATIONAL USING GPC CMDS. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 429	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]

LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR27

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "OPEN" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 3/4/5 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 430	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITTES
	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] H	3 [] C []

LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR19

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

EFFECTS/RATIONALE:

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LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE OX TK ISOL 3/4/5 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 431	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:2/1RDEORBIT:2/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [3]	B[F] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR19	·

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN FU & OX CONTROL FEEDBACKS. CONTROL FEEDBACKS INHIBIT VALVE OPERATION AFTER COMMAND HAS BEEN COMPLETED. THE FAILURE CAN RESULT IN THE OX ISOL 3/4/5 VALVE FAILING MIDTRAVEL WHEN COMMANDED OPEN. THE EFFECT WOULD BE LOSS OF SIX PRIMARY JETS CAUSING AN INABILITY TO COMPLETE TIME CRITICAL DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES DURING DEORBIT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 432	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICALI	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] E	3[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR20	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE FU & OX TK ISOL 3/4/5 VALVES USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOLD ISOL 3, 4 & 5 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4 AND 5, NO MISSION IMPACT.

ORBITER SOLDIDIE			
DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 433	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R		
ITEM: DIODE FAILURE MODE: FAILS SHORT			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)			
CRITICAL	TTTES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R	ABORT HDW/FUNC		
FLIGHT PHASE HDW/FUNC	RTTS: 2/1R		
PRELAUNCH: 3/3	$\frac{1}{2}$		
LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R	3/1R		
ONORBIT: 3/1R	ATO: 3/1R		
DEORBIT: 3/1R	ATO: 5/1R		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A [3]	B[P] C[P]		
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR20			
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD			
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "CLOSE" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 3/4/5 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.			
REFERENCES: VS70-942099 REV D EO	D01		

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 434	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU BREAKDOWN HIERARCHY:	BSYS LEAD: D.J. PAUL
1) ELECTRICAL COMPONENTS	
2) CONTROLS	
3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5	
5) DIODE	
6)	
7) 8)	
9)	
CRITICALITI	TPC
	ABORT HDW/FUNC
	RTLS: 2/1R
PRELAUNCH: 3/3 LIFTOFF: 3/3	TAL: $3/1R$
ONORBIT: 3/1R	AOA: $3/1R$
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	-,
REDUNDANCY SCREENS: A [3] B	[P] C[P]
LOCATION: F BAY 1, MCA 1	

PART NUMBER: 81V76AlllAlCR22

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU ISOL 3/4/5 VALVE USING GPC CMDS. THE VALVE IS STILL FULLY OPERATIONAL USING CREW SWITCH. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 435	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)		
CRITICAL	LITIES	
TTOUT DUNCE HOW/FIINC	ABORT HDW/FUNC	
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R	RTLS: 2/1R	
	TAL: $3/1R$	
	AOA: 3/1R	
UNURBIT: 5/1R	ATO: 3/1R	
DEORBIT: 3/IR	A10: 3/ 1R	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [3]	B[P] C[P]	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR22		
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "OPEN" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 3/4/5 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.		
REFERENCES: VS70-942099 REV D EO	DO1	

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 436		TICALITY HDW/FUN LIGHT: 3/1R BORT: 2/1R	С
ITEM: DIODE FAILURE MODE: FAILS OPEN			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD:	D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)			
CRITICAL	LITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT RTLS: TAL: AOA: ATO:	HDW/FUNC 2/1R 3/1R 3/1R 3/1R	
REDUNDANCY SCREENS: A [3]	B [P]	С[Р]	

LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76AlllalCR23

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN OX ISOL 3/4/5 VALVE USING GPC CMDS. THE VALVE IS STILL FULLY OPERATIONAL USING CREW SWITCH. LOSS OF ALL REDUNDANCY RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSE. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 437	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)</pre>	
CRITICA	LITIES
FLICHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $3/1R$
ONORBIT: 3/1R	AOA: $3/1R$
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR23	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC A FAILURE COULD POSSIBLY RESULT IN L CONTROL OX & FU TK ISOL 3/4/5 VALV REDUNDANCY, WORST CASE, RESULTS IN	VE OPERATION. LOSS OF ALL

CONTROL OX & FU TR ISOL 3/4/5 VALVE OFERITION AND 3/4/5 REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 438	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICALI	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B) [] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR21	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE FU & OX TK ISOL 3/4/5 VALVES USING GPC COMMANDS. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOLD ISOL 3, 4, & 5 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, AND 5. NO MISSION IMPACT.

ORBITER D				
DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 439		HIGHEST CRI F A	TICALITY LIGHT: BORT:	3/1R
ITEM: DIODE FAILURE MODE: FAILS	SHORT			
LEAD ANALYST: V.J. BU	RKEMPER	SUBSYS LEAD:	D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPO 2) CONTROLS 3) PROP STOR & DIST 4) OX & FU TK ISOL V 5) DIODE 6) 7) 8) 9)	SUBSYSTEM			
	COTUTCO	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING (SAFIN(UDW/FINC	ABORT	HDW/FUN	D
FLIGHT PHASE	nDw/runc	RTLS:	2/1R	
PRELAUNCH:	3/3	TAT.+	3/1R	
LIFTOFF:	3/3		3/1R	
ONORBIT:	3/1R	AUA	J/10	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING	3: 3/3			
REDUNDANCY SCREENS:	A [3]	В[Р]	С[Р]	
LOCATION: F BAY PART NUMBER: 81V76A	111A1CR21			
CAUSES: CONTAMINATI SHOCK, OVERLOAD	ON, VIBRATION,	MECHANICAL	SHOCK, THI	ERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION FAILURE COULD POSSIB CONTROL OX & FU TK I REDUNDANCY, WORST CA VALVES FAILED CLOSEI PROPELLANTS CONSEQUE DURING RTLS RESULTIN	LY RESULT IN SOL 3/4/5 VAL SE, RESULTS II D. THE EFFECT	VE OPERATION. N TK ISOL 1/2 IS AN INABIL Y BOUNDARIES	LOSS OF AND 3/4/ ITY TO DE WILL BE E	ALL 5 PLETE/USE
REFERENCES: VS70-94	2099 REV D EO	DOl		

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 440	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B) [] c []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR15	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE FU TK ISOL 3/4/5 VALVES USING GPC COMMANDS. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOLD ISOL 3, 4 & 5 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, AND 5. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 441	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)</pre>	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR15	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
FFFFCMC /DAMIONALE.	

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH CLOSE CMDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF ABILITY TO CLOSE FU & OX TK ISOL 3/4/5 VALVES USING CREW SWITCH OR GPC. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOL ISOL 3, 4, OR 5 BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, OR 5. NO MISSION IMPACT.

DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:442ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR2

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU TK ISOL 3/4/5 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 443	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)		
CRITICA	LITIES	
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR2		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CONT BUS AB1 AND MNA WHEN THE CREW SWITCH IS PLACED IN THE OPEN POSITON. NO EFFECT ON MISSION, ANY POSSIBLE CURRENT FLOW WILL BE LIMITED BY SERIES RESISTANCE.		
REFERENCES: VS70-942099 REV D EO	D01	

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 444	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	JBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICALIT	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR1	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE FU TK ISOL 3/4/5 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

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ORBITER SUBSYSTEM ANAL	
DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 445	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	DI DAIII.
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.S. FROZ
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRETTCI	ALITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	TAL: 3/3
DEORBIT: 3/3	AOA: 3/3
ONORBIT: 3/3	ATO: 3/3
DEORBIT: 3/3	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR1	
CAUSES: CONTAMINATION, VIBRATION SHOCK, OVERLOAD	, MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN FU & FEEDBACKS INHIBIT VALVE OPERATION COMPLETED. THE FAILURE CAN RESUL FAILING MIDTRAVEL WHEN COMMANDED INABILITY TO ISOLATE THE TANKS FU MISSION IMPACT.	T IN THE OX ISOL 3/4/5 VALVE

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 446	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
RITCAL CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [] I	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR24	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU TK ISOL 3/4/5 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 447	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR24	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEEN CONT BUS AB1 AND MNA WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION. NO EFFECT ON MISSION, ANY POSSIBLE CURRENT FLOW WILL BE LIMITED BY SERIES RESISTANCE.	

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 448	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR18	
CAUSES: CONTAMINATION, VIBRATION,	MECHANICAL SHOCK, THERMAL

SHOCK, OVERLOAD

EFFECTS/RATIONALE: LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE FU TK ISOL 3/4/5 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 449	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAL	lities
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/1R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [3]	B[F] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR18	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN FU & OX CONTROL FEEDBACKS. CONTROL FEEDBACKS INHIBIT VALVE OPERATION AFTER COMMAND HAS BEEN COMPLETED. THE FAILURE CAN RESULT IN THE FU ISOL 3/4/5 VALVE FAILING MIDTRAVEL WHEN COMMANDED OPEN. THE EFFECT WOULD BE LOSS OF SIX PRIMARY JETS CAUSING AN INABILITY TO COMPLETE TIME CRITICAL DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES DURING DEORBIT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 450	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR14	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE FU TK ISOL 3/4/5 VALVES USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOLD ISOL 3, 4 & 5 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, AND 5. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 451	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR14	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC A FAILURE COULD POSSIBLY RESULT IN L TK ISOL 3/4/5 VALVES USING CREW SW REDUNDANCY RESULTS IN THE TK ISOL 3, 4, 5 BECOMING STUCK IN THE OPEN AN INABILITY TO ISOLATE THE TANKS MISSION IMPACT.	VITCH OR GPC. LOSS OF ALL 3/4/5 AND MANIFOL ISOL 4 POSITION. THE EFFECT WOULD BE

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 452 ABORT: 3/3 ITEM: DIODE FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR16

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE OX TK ISOL 3/4/5 VALVES USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOLD ISOL 3, 4 & 5 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, AND 5. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 453	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FORC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR16	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH CLOSE CMDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF ABILITY TO CLOSE FU & OX TK ISOL 3/4/5 VALVES USING CREW SWITCH OR GPC. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOL ISOL 3, 4, 5 BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, OR 5. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 454	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 1, MCA 1	

PART NUMBER: 81V76A111A1CR3

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE OX TK ISOL 3/4/5 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 455	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR3	

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN FU & OX CONTROL FEEDBACKS. CONTROL FEEDBACKS INHIBIT VALVE OPERATION AFTER COMMAND HAS BEEN COMPLETED. THE FAILURE CAN RESULT IN THE FU ISOL 3/4/5 VALVE FAILING MIDTRAVEL WHEN COMMANDED CLOSED. THE EFFECT COULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, OR 5. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 456	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	RTLS: 3/3 TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR4	
CAUSES: CONTAMINATION, VIBRATION,	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE CONTROL FEEDBACK FROM OX TK ISOL 3/4/5 VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 457	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR4	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEEN CONT BUS AB2 AND MNA WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION. NO EFFECT ON MISSION, ANY POSSIBLE CURRENT FLOW WILL BE LIMITED BY SERIES RESISTANCE.	
REFERENCES: VS70-942099 REV D EO	D01

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 458	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] F	B[] C[]
LOCATION: F BAY 1, MCA 1	
PART NUMBER: 81V76A111A1CR17	
CAUSES: CONTAMINATION, VIBRATION, M	IECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE ABILITY TO CLOSE OX TK ISOL 3/4/5 VALVES USING GPC COMMANDS. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOLD ISOL 3, 4 & 5 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, AND 5. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 459	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DIODE 6) 7) 8) 9)		
CRITICA	LITIES	
ELTCHE PHASE HDW/FUNC	ABORT HDW/FUNC	
	RTLS: 2/1R	
TEROPE 3/3	TAL: 3/1R	
	AOA: 3/1R	
ONORBIT: 3/1R	ATO: 3/1R	
DEORBIT: 3/1R		
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [3]	B[P] C[P]	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR17		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN GPC AND CREW SWITCH "OPEN" COMMANDS. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR CREW SWITCH TO CONTROL OX & FU TK ISOL 3/4/5 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN TK ISOL 1/2 AND 3/4/5 VALVES FAILED CLOSED. THE EFFECT IS AN INABILITY TO DEPLETE/USE PROPELLANTS CONSEQUENTLY CG SAFETY BOUNDARIES WILL BE EXCEEDED DURING RTLS RESULTING IN LOSS OF VEHICLE/LIFE.		

DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:460ABORT:3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DRIVER, HYBRID 6) 7)
8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3
ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3
DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR1
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

HARDWIRED TALKBACK (BARBER POLE) TO CREW WILL FALSELY INDICATE FU & OX ISOL 1/2 VALVE MISMATCH WHEN VALVES ARE COMMANDED TO OPEN POSITION. GPC WILL INDICATE CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 461	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR1	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

HARDWIRED TALKBACK (BARBER POLE) TO CREW WILL FALSELY INDICATE FU & OX ISOL 1/2 VALVE MISMATCH WHEN VALVES ARE COMMANDED TO CLOSE POSITION. GPC WILL INDICATE CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 HI SUBSYSTEM: FRCS MDAC ID: 462	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUB	SYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] c[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR2	
CAUSES: CONTAMINATION, VIBRATION, PIE	CE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

HARDWIRED TALKBACK (BARBER POLE) TO CREW WILL FALSELY INDICATE FU & OX ISOL 1/2 VALVE MISMATCH WHEN VALVES ARE COMMANDED TO CLOSE POSITION. GPC WILL INDICATE CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 463	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	ITIES
TTTOWN DUNCE HOW/FUNC	
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
	-
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR2	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: HARDWIRED TALKBACK (BARBER POLE) TO & OX ISOL 1/2 VALVE MISMATCH WHEN V POSITION. GPC WILL INDICATE CORREC REDUNDANCY HAS NO IMPACT SINCE VALV	T VALVE POSITION. LOSS OF ALL

MISSION CRITICAL.

DATE: 1/27/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 464 ABORT: 3/3 ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: ELECTRICAL COMPONENTS 1) 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DRIVER, HYBRID 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 3/3 ONORBIT: AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76AlllAR3 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

HARDWIRED TALKBACK (BARBER POLE) TO CREW WILL FALSELY INDICATE FU & OX ISOL 3/4/5 VALVE MISMATCH WHEN VALVES ARE COMMANDED TO OPEN POSITION. GPC WILL INDICATE CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 465	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
CRITICAL FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111AR3	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: HARDWIRED TALKBACK (BARBER POLE) TO & OX ISOL 3/4/5 VALVE MISMATCH WHE POSITION. GPC WILL INDICATE CORRECT DESTROMMENT WAS NO IMPACT SINCE VAL	T VALVES ARE COMMANDED TO CLOSE CT VALVE POSITION. LOSS OF ALL

REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 466	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	3[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111AR4	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

HARDWIRED TALKBACK (BARBER POLE) TO CREW WILL FALSELY INDICATE FU & OX ISOL 3/4/5 VALVE MISMATCH WHEN VALVES ARE COMMANDED TO CLOSE POSITION. GPC WILL INDICATE CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 467	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111AR4	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: HARDWIRED TALKBACK (BARBER POLE) TO & OX ISOL 3/4/5 VALVE MISMATCH WHEN	CREW WILL FALSELY INDICATE FU VALVES ARE COMMANDED TO OPEN

& OX ISOL 3/4/5 VALVE MISMATCH WHEN VALVES ARE COMMANDED TO OFEN POSITION. GPC WILL INDICATE CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 468	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) FUSE, 1A 6) 7) 8) 9)	
CRITICA	LTTTES
	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3 AOA: 3/3 ATO: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
, , ,	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8F41	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ABILITY TO CLOSE FU & OX TK IS SWITCH. GPC COMMANDS ARE STILL AV RESULTS IN THE TK ISOL 1/2 AND MANJ STUCK IN THE OPEN POSITION. THE EN AN INABILITY TO ISOLATE THE TANKS N MISSION IMPACT.	AILABLE. LOSS OF ALL REDUNDANCY IFOLD ISOL 1&2 VALVES BECOMING FFECT WOULD BE

ORBITER SUBSIDIES INCL	
DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 469	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAOL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) FUSE, 1A 6) 7) 8) 9)	
CRITICAL	LITIES
HDW/FUNC	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
FLIGHT PHASE HDW/FUNC	RTLS: 2/1R
PRELAUNCH: 3/3	TAT.: 3/1R
LIFTOFF: 3/3	3/1R
ONORBIT: 3/1R	
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8F36	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ABILITY TO OPEN OR CLOSE FU & SWITCH. THE VALVES ARE STILL FULI LOSS OF ALL REDUNDANCY RESULTS IN FAILED CLOSED. THE EFFECT IS AN I PROPELLANTS CONSEQUENTLY CG SAFETY DURING RTLS RESULTING IN LOSS OF V	TK ISOL 1/2 & 3/4/5 VALVES INABILITY TO USE/DEPLETE BOUNDARIES WILL BE EXCEEDED

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 470	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) FUSE, 1A 6) 7) 8) 9)	
CRITICALIT	PIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	3/3
REDUNDANCY SCREENS: A [] B	[] c[]
LOCATION: PNL 08 S24	
PART NUMBER: 33V73A8F16	
CAUSES: CONTAMINATION, VIBRATION, MEC SHOCK, OVERLOAD	CHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE FU & OX TK ISOL 3/4/5 VALVES USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE. LOSS OF ALL REDUNDANCY RESULTS IN THE TK ISOL 3/4/5 AND MANIFOLD ISOL 3, 4 & 5 VALVES BECOMING STUCK IN THE OPEN POSITION. THE EFFECT WOULD BE AN INABILITY TO ISOLATE THE TANKS FROM MANIFOLDS 3, 4, AND 5. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 471	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) FUSE, 1A 6) 7) 8) 9)	
CRITICA	I.TTTFS
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	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: PNL 08 S24 PART NUMBER: 33V73A8F7	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ABILITY TO OPEN OR CLOSE FU & SWITCH. THE VALVES ARE STILL FULL LOSS OF ALL REDUNDANCY RESULTS IN ' FAILED CLOSED. THE EFFECT IS AN IN PROPELLANTS CONSEQUENTLY CG SAFETY DURING RTLS RESULTING IN LOSS OF V	Y OPERATIONAL USING GPC CMDS. TK ISOL 1/2 & 3/4/5 VALVES NABILITY TO USE/DEPLETE BOUNDARIES WILL BE EXCEEDED

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 472 ITEM: RELAY FAILURE MODE: FAILS (OPEN		TICALITY HDW/FUNC LIGHT: 2/1R BORT: 1/1
LEAD ANALYST: V.J. BUI	RKEMPER	SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPON 2) CONTROLS 3) PROP STOR & DIST 4) OX & FU TK ISOL V 5) RELAY 6) 7) 8) 9)	SUBSYSTEM		
	CRITICAI	TTTES	
FLIGHT PHASE			HDW/FUNC
FLIGHT PHASE PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	2/1R	RTLS: TAL: AOA:	2/1R
DEORBIT:	2/1R 2/1R	ATO:	2/1R
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS:	A [2]	B [F]	С[Р]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K1			
CAUSES: CONTAMINATION	N, VIBRATION,	PIECE PART F	AILURE, OVERLOAD
EFFECTS/RATIONALE:	ה דא הנוב בנו הצ	TSOT. 1 /2 VAL	VE BECOMING STUCK

THE FAILURE CAN RESULT IN THE FU TK ISOL 1/2 VALVE BECOMING STUCK IN THE CLOSED POSITION. THE EFFECT WOULD BE LOSS OF EIGHT PRIMARY JETS CAUSING AN INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET THE CG SAFETY BOUNDARIES. DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES.

DATE: 1/27/87 HI SUBSYSTEM: FRCS MDAC ID: 473	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: RELAY FAILURE MODE: FAILS HIGH		
LEAD ANALYST: V.J. BURKEMPER SUB	BSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)		
CRITICALITI	IES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
REDUNDANCY SCREENS: A [] B [[] C[]	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K1		
CAUSES: CONTAMINATION, VIBRATION, PIN	ECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE FU TK ISOL 1/2 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 1 OR 2 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS 1 OR 2. NO MISSION IMPACT.		
REFERENCES: VS70-942099 REV D EO DOl		

DATE: 1/27/87 HIGH SUBSYSTEM: FRCS MDAC ID: 474	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBS	YS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)	
CRITICALITIES	l .
FLIGHT PHASE HDW/FUNC AF	ORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] c []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3K2	
CAUSES: CONTAMINATION, VIBRATION, PIECE	PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE FU TK ISOL 1/ VALVE IS NORMALLY OPEN. REDUNDANCY FOR BY MANIFOLD 1 OR 2 ISOLATION VALVE. LOS IN AN INABILITY TO ISOLATE MANIFOLDS	THIS FUNCTION IS PROVIDED

1 OR 2. NO MISSION IMPACT.

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DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:476ABORT:3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
DEORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3 ATO: 3/3 LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3
PART NUMBER: 83V76A113K3
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:
THE FATLIDE DESILTS IN THE EN MY TOOL 3 (0 WATCH TO THE THE
VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED
BY MANIFOLD 1 OR 2 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS

BY MANIFOLD 1 OR 2 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS 1 OR 2. NO MISSION IMPACT.

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 477	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER SI	JBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)	
CRITICALI	les
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/1R DEORBIT: 2/1R	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 1/1
LIFTOFF: 3/3	TAL: 2/1R
ONORBIT: 2/1R	AOA: 2/1R
DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2] E	[F] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K3	
CAUSES: CONTAMINATION, VIBRATION, P	IECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE CAN RESULT IN THE FU TK I IN THE CLOSED POSITION. THE EFFECT V JETS CAUSING AN INABILITY TO EXPEL EN CG SAFETY BOUNDARIES. DURING RTLS OR AN INABILITY TO PERFOR ONORBIT. LOSS OF ALL REDUNDANCY WOULD VEHICLE/LIFE SINCE TRAPPED PROPELLAN	NOULD BE LOSS OF EIGHT PRIMARY NOUGH PROPELLANT TO MEET THE RM FULL MISSION OBJECTIVES D RESULT IN LOSS OF

REFERENCES: VS70-942099 REV D EO DO1

BOUNDARIES.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 478 ITEM: RELAY		F	TICALITY HDW/FUNC LIGHT: 2/1R BORT: 1/1
FAILURE MODE: FAILS OF	PEN		
LEAD ANALYST: V.J. BURN	KEMPER	SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONE 2) CONTROLS 3) PROP STOR & DIST S 4) OX & FU TK ISOL VI 5) RELAY 6) 7) 8) 9)	UBSYSTEM		
	CRITICAI	LITIES	
FLIGHT PHASE H PRELAUNCH: LIFTOFF: ONORBIT: DEODDIE:	IDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3 3/3 2/1R 2/1R	RTLS:	1/1
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT: DEORBIT:	2/1R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		
REDUNDANCY SCREENS:	A [2]	B [F]	С[Р]
LOCATION: F BAY 3A, PART NUMBER: 83V76A113			
CAUSES: CONTAMINATION,	VIBRATION,	PIECE PART FA	AILURE, OVERLOAD
EFFECTS/RATIONALE:			

EFFECTS/RATIONALE: THE FAILURE CAN RESULT IN THE OX TK ISOL 1/2 VALVE BECOMING STUCK IN THE CLOSED POSITION. THE EFFECT WOULD BE LOSS OF EIGHT PRIMARY JETS CAUSING AN INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET THE CG SAFETY BOUNDARIES. DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 479	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)	
CRITICA	LITIES
HDW/FIINC	ABORT HDW/FUNC
PRELAUNCH: 3/3	$\mathbf{RTLS:} \mathbf{3/3}$
LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 3/3	AOA: $3/3$
DEORBIT: 3/3	ATO: 3/3
FLIGHT PHASEHDM/10NCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K4	
CAUSES: CONTAMINATION, VIBRATION,	, PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE OX TK I VALVE IS NORMALLY OPEN. REDUNDAN BY MANIFOLD 1 OR 2 ISOLATION VALVI IN AN INABILITY TO ISOLATE MANIFOL 1 OR 2. NO MISSION IMPACT.	E. LOSS OF THESE VALVES RESULTS

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 480	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SI	JBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)	
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3
DEORBIT: 3/3	AOA: 3/3
LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K5	
CAUSES: CONTAMINATION, VIBRATION, PIL	ECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE OX TK ISOL 1/2 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 1 OR 2 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS 1 OR 2. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 481	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)	
CRITICA	LTTIES
TTCHE DWASE HOW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R	RTLS: 2/1R TAL: 3/1R
LIFTOFF: 3/3	TAL: 3/1R
ONORBIT: 3/1R	AOA: 3/1R
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3K5	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: NO EFFECT ON OX TK ISOLATION 1/2 V	ALVE OPERATION. WHAT WAS LOST SINGLE RELAY FAILURE FROM

NO EFFECT ON OX TK ISOLATION 1/2 VALVE OPERATION. WHAT WAS LOST WAS A SAFEGUARD DESIGNED TO KEEP A SINGLE RELAY FAILURE FROM CAUSING AN IMMEDIATE LOSS OF MISSION CAPABILITY BY FAILING THE OX TK ISOL VALVE CLOSED. SECOND FAILURE (FAILURE OF REDUNDANT RELAY) RESULTS IN THE LOSS OF EIGHT PRIMARY JETS CAUSING AN INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET THE CG SAFETY BOUNDARIES DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES DURING DEORBIT.

HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
UBSYS LEAD: D.J. PAUL
TIES
ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
[] c[]

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE OX TK ISOL 1/2 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 1 OR 2 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS 1 OR 2. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 483	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RELAY 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/1R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K6	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE CAN RESULT IN THE OX TK IN THE CLOSED POSITION. THE EFFECT JETS CAUSING AN INABILITY TO EXPEL CG SAFETY BOUNDARIES. DURING RTLS OR AN INABILITY TO PERFO ONORBIT. LOSS OF ALL REDUNDANCY WOU	WOULD BE LOSS OF EIGHT PRIMARY ENOUGH PROPELLANT TO MEET THE ORM FULL MISSION OBJECTIVES LD RESULT IN LOSS OF

VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES.

DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:2/1RMDAC ID:484ABORT:1/1
ITEM: RELAY FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)
CRITICALITIES
CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:1/1LIFTOFF:3/3TAL:2/1RONORBIT:2/1RAOA:2/1RDEORBIT:2/1RATO:2/1R
PRELAUNCH: 3/3 RTLS: 1/1
LIFTOFF: 3/3 TAL: 2/1R
ONORBIT: 2/1R AOA: 2/1R
DEORBIT: 2/1R ATO: 2/1R
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [2] B [F] C [P]
LOCATION: F BAY 1, MCA 1
PART NUMBER: 81V76A111K3
PARI NUMBER: OIV/GALLING
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:
THE FAILURE CAN RESULT IN THE FU TK ISOL 3/4/5 VALVE BECOMING
STUCK IN THE CLOSED POSITION. THE EFFECT WOULD BE LOSS OF SIX
PRIMARY JETS CAUSING AN INABILITY TO EXPEL ENOUGH PROPELLANT TO
MEET THE CG SAFETY BOUNDARIES DURING RTLS OR AN INABILITY TO
PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY

REFERENCES: VS70-942099 REV D EO DO1

WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES AND STRUCTURAL CONSTRAINTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 485	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3
DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K3	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE FU TK ISOL 3/4/5 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 3, 4 OR 5 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS FROM PROP TANKS. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 486	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K4	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE FU TK ISOL 3/4/5 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 3, 4 OR 5 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS FROM PROP TANKS. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 487	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:2/1RTAL:3/1RAOA:3/1RATO:3/1R
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K4	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

NO EFFECT ON FU TK ISOLATION 3/4/5 VALVE OPERATION. WHAT WAS LOST WAS A SAFEGUARD DESIGNED TO KEEP A SINGLE RELAY FAILURE FROM CAUSING AN IMMEDIATE LOSS OF MISSION CAPABILITY BY FAILING THE FU TK ISOL VALVE CLOSED. SECOND FAILURE (FAILURE OF REDUNDANT RELAY) RESULTS IN THE LOSS OF SIX PRIMARY JETS CAUSING AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES DURING DEORBIT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 488	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K5	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE FU TK ISOL 3/4/5 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 3, 4 OR 5 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS FROM PROP TANKS. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 489	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/1R DEORBIT: 2/1R	ABORT HDW/FUNC
FLIGHT PHASE INDW/ I ONO	RTIS: 1/1
PRELAUNCH: 3/3	TAT.: 2/1R
LIFTOFF: 3/3	$\lambda_{0}\lambda_{1}$ $2/1R$
ONORBIT: 2/1R	2/1P
DEORBIT: 2/1R	ATU: 2/IR
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K5	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE CAN RESULT IN THE FU TK ISOL 3/4/5 VALVE BECOMING STUCK IN THE CLOSED POSITION. THE EFFECT WOULD BE LOSS OF SIX PRIMARY JETS CAUSING AN INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET THE CG SAFETY BOUNDARIES DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES AND STRUCTURAL CONSTRAINTS.	
THE THE ALLOND DEV D FO	100

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 490	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICAL	LTMTEC
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	
LIFTOFF: 3/3	
ONORBIT: 2/1R	TAL: 2/1R
ONORBIT: 2/1R DEORBIT: 2/1R	AOA: 2/1R
LANDING/SAFING: 3/3	ATO: 2/1R
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 1, MCA 1	
PART NUMBER: 81V76A111K6	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:	

THE FAILURE CAN RESULT IN THE OX TK ISOL 3/4/5 VALVE BECOMING STUCK IN THE CLOSED POSITION. THE EFFECT WOULD BE LOSS OF SIX PRIMARY JETS CAUSING AN INABILITY TO EXPEL ENOUGH PROPELLANT TO MEET THE CG SAFETY BOUNDARIES DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ONORBIT. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE/LIFE SINCE TRAPPED PROPELLANTS WOULD EXCEED CG SAFETY BOUNDARIES AND STRUCTURAL CONSTRAINTS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 491	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICAL	ITIES
FITCUM DUNCE HOW/FINC	
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K6	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:	OT 2/4/5 VALVE FATLING OPEN.

THE FAILURE RESULTS IN THE OX TK ISOL 3/4/5 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 3, 4 OR 5 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS FROM PROP TANKS. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 492	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	·
REDUNDANCY SCREENS: A [] B	[] c[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K7	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE OX TK ISOL 3/4/5 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 3, 4 OR 5 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS FROM PROP TANKS, NO MISSION IMPACT.

ORBITER BODDEDEE	
DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 493	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
	LITIES
	ABORT HOW/FUNC
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/3	PTLS: 2/1R
PRELAUNCH: 3/3	$\frac{1}{2}$
LIFTOFF: 3/3	$\frac{1}{1}$
ONORBIT: 3/1R	AUA: $3/1R$
DEORBIT: 3/1R	ATU: 5/IR
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K7	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: NO EFFECT ON OX TK ISOLATION 3/4/5 WAS A SAFEGUARD DESIGNED TO KEEP A CAUSING AN IMMEDIATE LOSS OF MISS TK ISOL VALVE CLOSED. SECOND FAIL REDUNDANT (RELAY) RESULTS IN THE I AN INABILITY TO COMPLETE TIME CRIT RTLS OR AN INABILITY TO PERFORM FU LOSS OF ALL REDUNDANCY WOULD RESUL VEHICLE/LIFE SINCE TRAPPED PROPELT BOUNDARIES DURING DEORBIT.	ION CAPABILITY BY FAILING THE FU LURE (FAILURE OF LOSS OF SIX PRIMARY JETS CAUSING FICAL PROPELLANT DUMPS DURING JLL MISSION OBJECTIVES ONORBIT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 494	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K8	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE OX TK ISOL 3/4/5 VALVE FAILING OPEN. THE VALVE IS NORMALLY OPEN. REDUNDANCY FOR THIS FUNCTION IS PROVIDED BY MANIFOLD 3, 4 OR 5 ISOLATION VALVE. LOSS OF THESE VALVES RESULTS IN AN INABILITY TO ISOLATE MANIFOLDS FROM PROP TANKS. NO MISSION IMPACT.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 495	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RELAY 6) 7) 8) 9)	
CRITICAL	TTTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/1R DEORBIT: 2/1R	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 1/1
1.1 FTOFF: $3/3$	TAL: $2/1R$
ONORBIT: 2/1R	AOA: 2/1R
DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 3/3	,
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K8	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE CAN RESULT IN THE OX TK STUCK IN THE CLOSED POSITION. THE PRIMARY JETS CAUSING AN INABILITY MEET THE CG SAFETY BOUNDARIES DURIN PERFORM FULL MISSION OBJECTIVES ON WOULD RESULT IN LOSS OF VEHICLE/LIN WOULD EXCEED CG SAFETY BOUNDARIES	EFFECT WOULD BE LOSS OF SIX TO EXPEL ENOUGH PROPELLANT TO NG RTLS OR AN INABILITY TO ORBIT. LOSS OF ALL REDUNDANCY FE SINCE TRAPPED PROPELLANTS

REFERENCES: VS70-942099 REV D EO DO1

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 496	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3 ATO: 3/3
LANDING/SAFING: 3/3	A10. 575
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 3A, MCA 3	

PART NUMBER: 83V76A113A1R11

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

EFFECTS/RATIONALE:

LOSE ONE OF THREE REDUNDANT RESISTORS WHICH PROVIDE ISOLATION BETWEEN MAIN BUS AND VALVE POSITION TALKBACKS TO GPC. FAILURE OF ALL THREE RESISTORS RESULTS IN LOSS OF ALL TALKBACK FOR BOTH THE FU & OX ISOL 1/2 VALVE, NO EFFECT SINCE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 497	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R11	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO H	HARDWIRED AND GPC TALKBACKS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 498	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlR12	

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

EFFECTS/RATIONALE:

LOSE ONE OF THREE REDUNDANT RESISTORS WHICH PROVIDE ISOLATION BETWEEN MAIN BUS AND VALVE POSITION TALKBACKS TO GPC. FAILURE OF ALL THREE RESISTORS RESULTS IN LOSS OF ALL TALKBACK FOR BOTH THE FU & OX ISOL 1/2 VALVE, NO EFFECT SINCE TALKBACKS ARE NOT MISSION CRITICAL.

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DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 499	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R12	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	HARDWIRED AND GPC TALKBACKS.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87 C-401

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 500	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R3	

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

EFFECTS/RATIONALE:

LOSE ONE OF THREE REDUNDANT RESISTORS WHICH PROVIDE ISOLATION BETWEEN MAIN BUS AND VALVE POSITION TALKBACKS TO GPC. FAILURE OF ALL THREE RESISTORS RESULTS IN LOSS OF ALL TALKBACK FOR BOTH THE FU & OX ISOL 1/2 VALVE, NO EFFECT SINCE TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/27/87 FLIGHT: 3/3 SUBSYSTEM: FRCS MDAC ID: 501 ABORT: 3/3 RESISTOR, 1.2K 2W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2
5) RESISTOR, 1.2K 2W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R3 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO HARDWIRED AND GPC TALKBACKS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 502	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
PRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []]	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlR14	

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

EFFECTS/RATIONALE:

LOSE TALKBACK FOR THE FU TK ISOL 1/2 VALVE TO GPC (OPEN POSITION ONLY). HARDWIRE TALKBACK TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 503 ITEM: RESISTOR, 5.1K 1/4W	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R14	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	GPC.

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 504	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [[]] c []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R18	
CAUSES: CONTAMINATION, VIBRATION, MEC SHOCK, OVERLOAD	HANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE TALKBACK FOR CREW SWITCH POSITION ONLY). NO EFFECT, SWITCH OPERATION CA BY VALVE OPERATION.	

REFERENCES: VS70-942099 REV D EO DO1

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 505	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R18	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	GPC.

DATE: 1/27/87 HI SUBSYSTEM: FRCS MDAC ID: 506	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LINDING (SEELING: 2/2	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] c []
LOCATION: F BAY 3A, MCA 3	
PART NUMBER: 83V76A113A1R27	
CAUSES: CONTAMINATION, VIBRATION, MEC SHOCK, OVERLOAD	HANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE TALKBACK FOR THE FU TK ISOL 1/2 V.	ALVE TO GPC (CLOSE POSITION

LOSE TALKBACK FOR THE FU TK ISOL 1/2 VALVE TO GPC (CLOSE POSITION ONLY). HARDWIRE TALKBACK TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 507	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICA	LITIES
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFING: 3/3	ABORT HDW/FUNC
DELAUNCH: 3/3	RTLS: 3/3
LIETOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R27	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	GPC.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 508 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3 TAL: 3/3
LIFTOFF: 3/3	TAL: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	6 [] c []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R13	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE TALKBACK FOR CREW SWITCH POSITI	ON TO GRE (CLOSE BOSTITON

LOSE TALKBACK FOR CREW SWITCH POSITION TO GPC (CLOSE POSITION ONLY). NO EFFECT, SWITCH OPERATION CAN BE INDIRECTLY DETERMINED BY VALVE OPERATION.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 509 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlR13	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	GPC.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 510	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	·
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R15	
CAUSES: CONTAMINATION, VIBRATION, N SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE TALKBACK FOR THE OX TK ISOL 1/2 VALVE TO GPC (OPEN POSITION ONLY). HARDWIRE TALKBACK TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 511	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
COTUTCA	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3	ABORT HDW/FUNC
FLIGHT PHASE HDW/FUNC	RTLS: 3/3
	TAL: $3/3$
OVODDITE: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
LANDING/SATING. 5/5	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R15	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	GPC.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 512	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TIES
	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3	RTLS: 3/3 TAL: 3/3
	TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	,
REDUNDANCY SCREENS: A [] B	[] c[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R28	

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

EFFECTS/RATIONALE:

LOSE TALKBACK FOR THE OX TK ISOL 1/2 VALVE TO GPC (CLOSE POSITION ONLY). HARDWIRE TALKBACK TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 513	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICA	LITIES
FITCHE DUASE HOW/FINC	ABORT HDW/FUNC
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
DEODDIE: 3/3	ATO: 3/3
$\frac{DEURBIT}{LEURBIT} = \frac{3}{2}$	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R28	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	GPC.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 514	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: SIV76ALLIAIRI	

PART NUMBER: 81V76A111A1R1

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

EFFECTS/RATIONALE:

LOSE ONE OF THREE REDUNDANT RESISTORS WHICH PROVIDE ISOLATION BETWEEN MAIN BUS AND VALVE POSITION TO GPC. FAILURE OF ALL THREE RESISTORS RESULTS IN LOSS OF ALL TALKBACKS FOR BOTH FU & OX ISOL 3/4/5 VALVE, NO EFFECT SINCE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 515	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: $3/3$	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R1	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	HARDWIRE AND GPC TALKBACKS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 516	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R2	

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

EFFECTS/RATIONALE:

LOSE ONE OF THREE REDUNDANT RESISTORS WHICH PROVIDE ISOLATION BETWEEN MAIN BUS AND VALVE POSITION TO GPC. FAILURE OF ALL THREE RESISTORS RESULTS IN LOSS OF ALL TALKBACKS FOR BOTH FU & OX ISOL 3/4/5 VALVE, NO EFFECT SINCE TALKBACKS ARE NOT MISSION CRITICAL.

SUBSYSTEM: FRCS MDAC ID: 517	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R2	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	HARDWIRE AND GPC TALKBACKS.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 518	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R3	
CAUSES: CONTAMINATION, VIBRATION 1	MECHANICAL SHOCK THERMAL

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

EFFECTS/RATIONALE:

LOSE ONE OF THREE REDUNDANT RESISTORS WHICH PROVIDE ISOLATION BETWEEN MAIN BUS AND VALVE POSITION TO GPC. FAILURE OF ALL THREE RESISTORS RESULTS IN LOSS OF ALL TALKBACKS FOR BOTH FU & OX ISOL 3/4/5 VALVE, NO EFFECT SINCE TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/27/87 DATE: FLIGHT:3/3ABORT:3/3 SUBSYSTEM: FRCS MDAC ID: 519 RESISTOR, 1.2K 2W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 1.2K 2W 6) 7) 8) 9) CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3 CRITICALITIES LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R3 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO HARDWIRE AND GPC TALKBACKS.

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 520	IIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	JBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	TAL: 3/3 AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	[] c []
LOCATION: F BAY 1, MCA 1	
PART NUMBER: 81V76A111A1R23	
CAUSES: CONTAMINATION, VIBRATION, MEG	CHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE TALKBACK FOR THE FU TK ISOL 3/4/5 VALVE TO GPC (OPEN POSITION ONLY). HARDWIRE TALKBACK (BARBER POLE) TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/27/87 DATE: FLIGHT:3/3ABORT:3/3 SUBSYSTEM: FRCS MDAC ID: 521 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 3/3 PRELAUNCH: 3/3 3/3 LIFTOFF: TAL: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R23 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO GPC.

DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:522ABORT:3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R24 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL, SHOCK THERMAL

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

EFFECTS/RATIONALE:

LOSE TALKBACK FOR CREW SWITCH POSITION TO GPC (OPEN POSITION ONLY). NO EFFECT, SWITCH OPERATION CAN BE INDIRECTLY DETERMINED BY VALVE OPERATION.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 523	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAI	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3	
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76AlllAlR24	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO (GPC.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 524	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	c []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R10	
CAUSES: CONTAMINATION, VIBRATION, M	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE TALKBACK FOR THE FU TK ISOL 3/4/5 VALVE TO GPC (CLOSE POSITION ONLY). HARDWIRE TALKBACK (BARBER POLE) TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 525	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
TTCHE DHASE HOW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R10	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO	GPC.

DATE:1/27/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:526ABORT:3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R14
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE TALKBACK FOR CREW SWITCH POSITION TO GPC (CLOSE POSITION ONLY). NO EFFECT, SWITCH OPERATION CAN BE INDIRECTLY DETERMINED BY VALVE OPERATION.

DATE: 1/27/87 HIG SUBSYSTEM: FRCS MDAC ID: 527 ITEM: RESISTOR, 5.1K 1/4W	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3			
FAILURE MODE: FAILS SHORT				
LEAD ANALYST: V.J. BURKEMPER SUBS	SYS LEAD: D.J. PAUL			
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>				
CRITICALITIE	2S			
FLIGHT PHASE HDW/FUNC	BORT HDW/FUNC			
PRELAUNCH: 3/3	RTLS: 3/3			
LIFTOFF: 3/3	TAL: 3/3			
ONORBIT: 3/3	AOA: 3/3			
FLIGHT PHASE HDW/FUNC A PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3			
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] C[]			
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R14				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO GPC.				

REFERENCES: VS70-942099 REV D EO DO1

DATE: 1/27/87 H SUBSYSTEM: FRCS MDAC ID: 528	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	JBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	[] C[]

LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R22

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

EFFECTS/RATIONALE:

LOSE TALKBACK FOR THE OX TK ISOL 3/4/5 VALVE TO GPC (OPEN POSITION ONLY). HARDWIRE TALKBACK (BARBER POLE) TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

REFERENCES: VS70-942099 REV D EO DO1

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DATE: 1/27/87 HIG SUBSYSTEM: FRCS MDAC ID: 529	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3			
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT				
LEAD ANALYST: V.J. BURKEMPER SUBS	SYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)				
CRITICALITI	ES			
FLIGHT PHASE HDW/FUNC 2 PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	ABORT HDW/FUNC			
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3			
LIFTOFF: 3/3	TAL: 3/3			
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3			
DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3			
REDUNDANCY SCREENS: A [] B [] c []			
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R22				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO GPC.				

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87

C-431

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 530	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R11	

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

EFFECTS/RATIONALE:

LOSE TALKBACK FOR THE OX TK ISOL 3/4/5 VALVE TO GPC (CLOSE POSITION ONLY). HARDWIRE TALKBACK (BARBER POLE) TO CREW WILL INDICATE CORRECT POSITION. LOSS OF ALL REDUNDANCY HAS NO IMPACT SINCE VALVE TALKBACK IS NOT MISSION CRITICAL.

REFERENCES: VS70-942099 REV D EO DO1

DATE: 1/27/87 SUBSYSTEM: FRCS MDAC ID: 531	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A []	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R11	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, TALKBACK STILL AVAILABLE TO (GPC.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0430 REV E AMENDMENT SEQ. 7

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:532ABORT:3/3				
ITEM: OX & FU TK ISOL VLV 1/2 SWITCH FAILURE MODE: SWITCH FAILS IN THE OPEN POSITION				
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH 6) 7) 8) 9)				
CRITICALITIES				
CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM CLOSE COMMANDS. IF THE SWITCH FAILS IN THE OPEN POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY THE SWITCH OR BY THE MDM COMMANDS. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM				

CONTACTS SETS AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 533		HIGHEST C	RITICALITY FLIGHT: ABORT:	3/1R	
ITEM: OX & FU TK ISOL VLV 1/2 SWITCH FAILURE MODE: SWITCH FAILS IN THE CLOSED POSITION					
LEAD ANALYST: V.J. BURKE	MPER S	SUBSYS LE	AD: D.J. PAU	L	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH 6) 7) 8) 9)					
	CRITICALI	TIES			
FLIGHT PHASE HD	W/FUNC	ABORT	HDW/FUN	C	
PRELAUNCH:	3/3	RTLS	: 2/1R		
LIFTOFF:	3/3	TAL:	3/1R		
ONORBIT:	3/2R	AOA:	3/1R		
DEORBIT:	3/1R	ATO:	3/1R		
FLIGHT PHASE HE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3				
REDUNDANCY SCREENS: A					
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23					
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD					
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE SWITCH FAILS IN THE CLOSED POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED					

IN THE CLOSED POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED BY THE SWITCH OR BY THE MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CLOSE CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 534	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH FAILS IN THE	1/2 SWITCH GPC POSITION
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH 6) 7) 8) 9)	3
CRITICAI	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23	

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

EFFECTS/RATIONALE:

VALVE CANNOT BE CONTROLLED BY SWITCH, ONLY BY MDM COMMANDS, TO OPERATE THE VALVE, THE CREW MUST USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WHILE THE VALVE IS IN THE CLOSED POSITION WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ENTRY AND ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 535	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R			
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH OPEN CONTACTS	1/2 SWITCH OPEN CONTACTS 1, 2 FAIL OPEN			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL			
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)</pre>				
CRITICAL	ITIES			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING (SAFING: 2/2	ABORT HDW/FUNC			
PRELAUNCH: 3/3	RTLS: 2/1R			
LIFTOFF: 3/3	TAL: 3/1R			
ONORBIT: 3/2R	AOA: 3/1R			
DEORBIT: 3/1R	ATO: 3/1R			
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [2]	B[F] C[P]			
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM COMMANDS. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CANNOT BE OPENED BY THE SWITCH COMMANDS, ONLY BY MDM COMMANDS, AND CAN BE CLOSED BY SWITCH OR MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO BURN ENOUGH PROPELLANT DURING RTLS ABORTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES.

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:536ABORT:3/3				
ITEM: OX & FU TK ISOL VLV 1/2 SWITCH OPEN CONTACTS 1, 2 FAILURE MODE: SWITCH OPEN CONTACTS FAIL CLOSED				
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL				
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)</pre>				
CRITICALITIES				
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC				
PRELAUNCH: 3/3 RTLS: 3/3				
PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3				
ONORBIT: 3/3 AOA: 3/3				
DEORBIT: 3/3 ATO: 3/3				
LANDING/SAFING: 3/3				
REDUNDANCY SCREENS: A [] B [] C []				
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23				

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM COMMANDS. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE OPEN OR GPC POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY MDM COMMAND, ONLY BY SWITCH COMMAND. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE CLOSED POSITION, THE VALVE WILL REMAIN CLOSED, AND CANNOT BE OPENED BY MDM COMMANDS, ONLY BY SWITCH COMMANDS. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

REFERENCES: VS70-943099 REV B EO B12, CC, DC; FLIGHT RULE 6-95

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 537	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3				
ITEM: OX & FU TK ISOL VLV 1/2 SWITCH GPC CONTACTS 3, 4 FAILURE MODE: SWITCH GPC CONTACTS FAIL OPEN					
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL				
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH GPC CONTACTS 3, 4 6) 7) 8) 9)</pre>					
ייידפיט	ICALITIES				
CRIT: FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC				
DEFLAINCH• 3/3	RTLS: 3/3				
LIFTOFF: 3/3	TAL: 3/3				
ONORBIT: $3/3$	AOA: 3/3				
DEORBIT: $3/3$	ATO: 3/3				
LANDING/SAFING: 3/3					
REDUNDANCY SCREENS: A []	в[] с[]				
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23					
CAUSES: CONTAMINATION, VIBRATION SHOCK, OVERLOAD	ON, MECHANICAL SHOCK, THERMAL				
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN	A CIRCUIT.				

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DATE: 1/13/8 SUBSYSTEM: FRCS MDAC ID: 538	7	HIGHEST CR	ITICALITY FLIGHT: ABORT:	3/3	
ITEM: OX & FAILURE MODE: SWITC	FU TK ISOL VLV H GPC CONTACTS	1/2 SWITCH FAIL CLOSED	GPC CONTAC	CTS 3, 4	
LEAD ANALYST: V.J. B	URKEMPER	SUBSYS LEAD	: D.J. PAU	L	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH GPC CONTACTS 3, 4 6) 7) 8) 9)					
	CRITTCAT	LITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUN	2	
PRELAUNCH:	3/3	RTLS: TAL: AOA: ATO:	3/3		
LIFTOFF:	3/3	TAL:	3/3		
ONORBIT:	3/3	AOA:	3/3		
DEORBIT:	3/3	ATO:	3/3		
PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	G: 3/3		•		
REDUNDANCY SCREENS:	A []	B[]	c[]		
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23					
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD					
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.					

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 539	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH CLOSE CONTAC	1/2 SWITCH CLOSE CONTACTS 5, 6 IS FAIL OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH CLOSE CONTACTS 5, 6 6) 7) 8) 9)</pre>			
CRITICA	LITIES		
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3		
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23			
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD			
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY MDM COMMANDS. IF THE CLOSDE CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSTION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE OPENED BY SWITCH OR MDM COMMANDS, AND CANNOT BE CLOSED BY SWITCH COMMANDS, ONLY BY MDM COMMANDS. FAILURE OF THE MDM CLOSE COMMANDS WILL CAUSE THE INABILITY TO CLOSE THE VALVE.			

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 540	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R	
ITEM: OX & FU TK ISOL VLV 1/2 SWITCH CLOSE CONTACTS 5, 6 FAILURE MODE: SWITCH CLOSE CONTACTS FAIL CLOSED		
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH CLOSE CONTACTS 5, 6 6) 7) 8) 9)</pre>		
CRITICALI	TIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC	
REDUNDANCY SCREENS: A [2]	B[F] C[P]	
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23		
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL	

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE OTHER SWITCH CLOSE CONTACTS AND THE MDM CLOSE COMMANDS. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE CLOSED BY SWITCH OR MDM COMMAND, AND CANNOT BE OPENED BY SWITCH OR MDM COMMANDS. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY AND MAY CAUSE THE INABILITY TO BURN ENOUGH PROPELLANT DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 541	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH OPEN CONTACTS	1/2 SWITCH OPEN CONTACTS 7, 8 5 FAIL OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH OPEN CONTACTS 7, 8 6) 7) 8) 9)</pre>		
CRITICAL	LITIES	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: $3/3$	
LIFTOFF: 3/3	TAL: 3/3	
ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A []		
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	

EFFECTS/RATIONALE:

NO REDUNDANCY PROVIDED PROVIDED TO INHIBIT THE CLOSE RELAYS. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, AND CAN BE OPENED OR CLOSED BY THE SWITCH OR MDM COMMANDS.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 542	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH OPEN CONTACTS	1/2 SWITCH OPEN CONTACTS 7, 8 FAIL CLOSED	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH OPEN CONTACTS 7, 8 6) 7) 8) 9)</pre>		
CRITICALI	TIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3	
LIFTOFF: 3/3	TAL: 3/3	
ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [] E	9[] C[]	
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23		

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

EFFECTS/RATIONALE:

NO REDUNDANCY PROVIDED TO INHIBIT THE CLOSE RELAYS. IF THE OPEN CONTACTS FAIL WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CANNOT BE CLOSED BY SWITCH OR MDM COMMAND, AND CAN BE OPENED BY SWITCH OR MDM COMMANDS. TO CLOSE THE VALVE WITH THE MDM COMMAND, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE OPEN CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

REFERENCES: VS70-943099 REV B EO B12, CC, DC; FLIGHT RULE 6-95

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 543	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH GPC CONTACTS	1/2 SWITCH GPC CONTACTS 9, 10 FAIL OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH GPC CONTACTS 9, 10 6) 7) 8) 9)</pre>			
CRITICAL	JTIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: 3/3		
ONORBIT: 3/3	AOA: 3/3		
DEORBIT: 3/3	ATO: 3/3		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23			
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A (CIRCUIT.		

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 544	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: FAILURE MODE: OX & FU TK ISOL VLV SWITCH GPC CONTACTS	<pre>1/2 SWITCH GPC CONTACTS 9, 10 FAIL CLOSED</pre>		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH GPC CONTACTS 9, 10 6) 7) 8) 9)</pre>			
CRITICAL	TUTES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFINC: 2/2	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: 3/3		
ONORBIT: 3/3	AOA: 3/3		
DEORBIT: 3/3	ATO: 3/3		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23			
CAUSES: CONTAMINATION, VIBRATION, I SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A C	IRCUIT.		

HIGHEST CRITICALITY HDW/FUNC 1/13/87 DATE: 3/3 FLIGHT: SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 545 OX & FU TK ISOL VLV 1/2 SWITCH CLOSE CONTACTS 11, ITEM: 12 FAILURE MODE: SWITCH CLOSE CONTACTS FAIL OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS CONTROLS 2) 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH CLOSE CONTACTS 11, 12 6) 7) 8) 9) CRITICALITIES FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORPHT:3/22/22/2 AOA: 3/3 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY MDM COMMANDS. IF THE CLOSE CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSTION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE OPENED BY SWITCH OR MDM COMMANDS, AND CANNOT BE CLOSED BY SWITCH COMMANDS, ONLY BY MDM COMMANDS. FAILURE OF THE MDM CLOSE COMMANDS WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

SUBSYSTEM: FRCS MDAC ID: 546	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R	
ITEM: OX & FU TK ISOL VLV 1/2 SWITCH CLOSE CONTACTS 11, 12 FAILURE MODE: SWITCH CLOSE CONTACTS FAIL CLOSED		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS		
3) PROP STOR & DIST SUBSYSTEM		
4) OX & FU TK ISOL VLV 1/2 5) OX & FU TK ISOL VLV 1/2 SWITCH		
6)	CHOSE CONTRETS II, 12	
7) 8) 9)		
CRITICAL	ITIES	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC	
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	$\begin{array}{ccc} \text{RTLS:} & 2/1\text{R} \\ \text{TAL} & 2/1\text{R} \end{array}$	
ONORBIT: 3/2R	AOA: 3/1R	
DEORBIT: 3/1R	ATO: $3/1R$	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [2]	B[F] C[P]	
LOCATION: PNL 08 S23 PART NUMBER: 33V73A8S23		

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE OTHER SWITCH CLOSE CONTACTS AND THE MDM CLOSE COMMANDS. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION AND CAN BE CLOSED BY SWITCH OR MDM COMMAND, BUT CANNOT BE OPENED BY SWITCH OR MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CLOSE CONTACTS, AND USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ENTRY AND ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 547	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH FAILS IN THE	3/4/5 SWITCH OPEN POSITION	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWIT 6) 7) 8) 9)	гсн	
CRITICA	LITIES	
CRITICAL FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3	
LIFTOFF: 3/3	TAL: 3/3	
ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A []		
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM CLOSE COMMANDS. IF THE SWITCH FAILS IN THE OPEN POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY THE SWITCH OR BY THE MDM COMMANDS. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM CONTACTS SETS AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.		
REFERENCES: VS70-943099 REV B EO	B12, CC, DC	

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 548	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: FAILURE MODE: OX & FU TK ISOL VLV SWITCH FAILS IN THE	3/4/5 SWITCH CLOSED POSITION
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWIT 6) 7) 8) 9)	СН
CRITICAL	TTIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/2R AOA: 3/2R ATO: 3/2R
REDUNDANCY SCREENS: A [2]	B [P] C [P]
LOCATION: PNL 08 S24	

PART NUMBER: 33V73A8S24

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE SWITCH FAILS IN THE CLOSED POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED BY THE SWITCH OR BY THE MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CLOSE CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 549	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH FAILS IN THE	3/4/5 SWITCH GPC POSITION
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWIT 6) 7) 8) 9)	СН
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/2R AOA: 3/2R ATO: 3/2R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24	NECHANICAL SHOCK THERMAL

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

EFFECTS/RATIONALE:

VALVE CANNOT BE CONTROLLED BY SWITCH, ONLY BY MDM COMMANDS. TO OPERATE THE VALVE, THE CREW MUST USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WHILE THE VALVE IS IN THE CLOSED POSITION WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ENTRY AND ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 550	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH OPEN CONTACT	3/4/5 SWITCH OPEN CONTACTS 1, 2 S FAIL OPEN
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWI 6) 7) 8) 9)	TCH OPEN CONTACTS 1, 2
CRITICA	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	RTLS: 2/1R TAL: 3/2R
LIFTOFF: 3/3	TAL: 3/2R
ONORBIT: 3/2R	AOA: 3/2R
DEORBIT: 3/1R	ATO: 3/2R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24	

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM COMMANDS. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CANNOT BE OPENED BY THE SWITCH COMMANDS, ONLY BY MDM COMMANDS, AND CAN BE CLOSED BY SWITCH OR MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO BURN ENOUGH PROPELLANT DURING RTLS ABORTS TO MEET THE TANK LANDING WEIGHT CONSTRAINTS AND/OR THE CG SAFETY BOUNDARIES.

SUBSYSTEM: FRCS MDAC ID: 551	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: OX & FU TK ISOL VLV 3/ FAILURE MODE: SWITCH OPEN CONTACTS F	4/5 SWITCH OPEN CONTACTS 1, 2 AIL CLOSED		
LEAD ANALYST: V.J. BURKEMPER SU	IBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)			
CRITICALI	IES		
CRITICALIT FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: $3/3$		
ONORBIT: 3/3	AUA: 3/3		
DEORBIT: 3/3 LANDING/SAFING: 3/3	A10. 373		
REDUNDANCY SCREENS: A [] B			
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24			
CAUSES: CONTAMINATION, VIBRATION, MI SHOCK, OVERLOAD	CHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM COMMA FAIL CLOSED WHILE THE SWITCH IS IN TH	NDS. IF THE OPEN CONTACTS HE OPEN OR GPC POSITION, THE		

VALVE WILL OPEN AND CANNOT BE CLOSED BY MDM COMMAND, ONLY BY SWITCH COMMAND. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE CLOSED POSITION, THE VALVE WILL REMAIN CLOSED, AND CANNOT BE OPENED BY MDM COMMANDS, ONLY BY SWITCH COMMANDS. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

REFERENCES: VS70-943099 REV B EO B12, CC, DC; FLIGHT RULE 6-95

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DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:552ABORT:3/3
ITEM: OX & FU TK ISOL VLV 3/4/5 SWITCH GPC CONTACTS 3, 4 FAILURE MODE: SWITCH GPC CONTACTS FAIL OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWITCH GPC CONTACTS 3, 4 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
PRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
PRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 S24
PART NUMBER: 33V73A8S24
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 553	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH GPC CONTACTS	3/4/5 SWITCH GPC CONTACTS 3, 4 FAIL CLOSED
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWIT 6) 7) 8) 9)	TCH GPC CONTACTS 3, 4
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A (CIRCUIT.

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DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 554	HIGHEST	CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: OX & FU TK IS 6 FAILURE MODE: SWITCH CLOSE		
LEAD ANALYST: V.J. BURKEMPE	R SUBSYS L	EAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYS 4) OX & FU TK ISOL VLV 3/4 5) OX & FU TK ISOL VLV 3/4 6) 7) 8) 9)	STEM	CONTACTS 5, 6
	CRITICALITIES	
FLIGHT PHASE HDW/FU PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	INC ABORT	HDW/FUNC
PRELAIINCH: 3/3	RT	(S: 3/3
I.TETOFF: 3/3	ጥልነ	L: 3/3
ONOPRIT: 3/3	201	A: 3/3
	200	1. 3/3
LANDING/SAFING: 3/3	AIV	. 5/5
LANDING/SATING: 5/5		
REDUNDANCY SCREENS: A [] B[]	c []
LOCATION: PNL O8 S24 PART NUMBER: 33V73A8S24		
CAUSES: CONTAMINATION, VIB SHOCK, OVERLOAD	ATION, MECHANIC	AL SHOCK, THERMAL
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY MDM (OPEN WHILE THE SWITCH IS IN THAT POSITION, CAN BE OPENED BE CLOSED BY SWITCH COMMANDS ONLY BY MDM COMMANDS. FAIL CAUSE THE INABILITY TO CLOSE	ANY POSTION, THE BY SWITCH OR MD S, JRE OF THE MDM CI	VALVE WILL REMAIN IN M COMMANDS, AND CANNOT

	ORDITER DODDE			
MDAC TO:	1/13/87 FRCS 555		ABORT:	3/1R 3/1R
ITEM:	OX & FU TK	ISOL VLV 3/4/5	SWITCH CLOSE	CONTACTS 5,
		SE CONTACTS FAI		
LEAD ANALYS	T: V.J. BURKEM	PER SUBSY	S LEAD: D.J.	PAUL
2) CONTRO 3) PROP ST	ICAL COMPONENTS LS FOR & DIST SUBS	SYSTEM	OSE CONTACTS	5, 6
		CRITICALITIES	5	
DT TOUM	DHASE HDW	/FUNC AI	30RT HDW/	FUNC
TIGUI	AUNCH• 3	/3	RTLS: 3/	/lR
FREL T TRU	AUNCII. S	/3	TAL: 3 /	/2R
LIFT		/ 2	AOA: 3/	/2R
ONOR		/10	ATO: 3/	/2R
DEOR LAND	ING/SAFING: 3	CRITICALITIES /FUNC AN /3 /3 /2R /1R /3		
REDUNDANCY	SCREENS: A	[2] B[F] C[P]
PART NUMBER	PNL 08 524 R: 33V73A8524			
CAUSES: CO SHOCK, OVER	NTAMINATION, V RLOAD	IBRATION, MECH	ANICAL SHOCK,	THERMAL
MDM CLOSE SWITCH IS I POSITION, OPENED BY S MUST REMOV GPC READ/W ONORBIT OP	PROVIDED BY TH COMMANDS. IF IN ANY POSITION CAN BE CLOSED F SWITCH OR MDM (YE CONTROL BUS RITE PROCEDURES ERATIONS, PROPH	HE OTHER SWITCH THE CLOSE CONTA , THE VALVE WI BY SWITCH OR MD COMMANDS. TO O POWER FROM THE S. FAILURE OF ELLANT DUMP LEN INABILITY TO BU ET THE CG SAFE	LL REMAIN IN ' M COMMAND, AN PEN THE VALVE CONTACTS, AND ALL REDUNDANC IGTHS DURING A JRN ENOUGH PRO	THAT D CANNOT BE THE CREW THEN USE THE WILL AFFECT BORTS AND PELLANT

REFERENCES: VS70-943099 REV B EO B12, CC, DC

DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 556	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH OPEN CONTACT	3/4/5 SWITCH OPEN CONTACTS 7, 8 S FAIL OPEN
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWI 6) 7) 8) 9)	TCH OPEN CONTACTS 7, 8
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	λπο. 3/3
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

NO REDUNDANCY PROVIDED PROVIDED TO INHIBIT THE CLOSE RELAYS. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, AND CAN BE OPENED OR CLOSED BY THE SWITCH OR MDM COMMANDS.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 557	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: OX & FU TK ISOL VLV FAILURE MODE: SWITCH OPEN CONTACTS	3/4/5 SWITCH OPEN CONTACTS 7, 8 FAIL CLOSED
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWIT 6) 7) 8) 9)	CH OPEN CONTACTS 7, 8
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

NO REDUNDANCY PROVIDED TO INHIBIT THE CLOSE RELAYS. IF THE OPEN CONTACTS FAIL WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CANNOT BE CLOSED BY SWITCH OR MDM COMMAND, AND CAN BE OPENED BY SWITCH OR MDM COMMANDS. TO CLOSE THE VALVE WITH THE MDM COMMAND, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE OPEN CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

REFERENCES: VS70-943099 REV B EO B12, CC, DC; FLIGHT RULE 6-95

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:558ABORT:3/3
ITEM: OX & FU TK ISOL VLV 3/4/5 SWITCH GPC CONTACTS 9, 10 FAILURE MODE: SWITCH GPC CONTACTS FAIL OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWITCH GPC CONTACTS 9, 10 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24
PART NOMBER. 557/5R6524
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.

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DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 559	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: OX & FU TK ISOL VI FAILURE MODE: SWITCH GPC CONTACT	LV 3/4/5 SWITCH GPC CONTACTS 9, 10 S FAIL CLOSED
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SW 6) 7) 8) 9)	
CDITT	CALITIES
ELICUM DUNCE HDW/FUNC	ABORT HDW/FUNC
DEFLAINCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
CRITIC FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24	
CAUSES: CONTAMINATION, VIBRATION SHOCK, OVERLOAD	N, MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN	A CIRCUIT.

SUBSYSTEM: FRCS MDAC ID: 560	ITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: OX & FU TK ISOL VLV 3/4/5 SWITC	H CLOSE CONTACTS 11,
FAILURE MODE: SWITCH CLOSE CONTACTS FAIL OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD	: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) OX & FU TK ISOL VLV 3/4/5 5) OX & FU TK ISOL VLV 3/4/5 SWITCH CLOSE COM 6) 7) 8) 9)	NTACTS 11, 12
CRITICALITIES	
FLIGHT PHASE HDW/FUNC ABORT	HDW/FUNC
PRELAUNCH: 3/3 RTLS:	3/3
LIFTOFF: 3/3 TAL:	3/3
ONORBIT: 3/3 AOA.	3/3
	3/3
FLIGHT PHASE HDW/FUNC ABORT PRELAUNCH: 3/3 RTLS: LIFTOFF: 3/3 TAL: ONORBIT: 3/3 AOA: DEORBIT: 3/3 ATO: LANDING/SAFING: 3/3	3/3
REDUNDANCY SCREENS: A [] B []	c []
LOCATION: PNL 08 S24 PART NUMBER: 33V73A8S24	
PARI NUMBER: 33V/3A8524	
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL S SHOCK, OVERLOAD	HOCK, THERMAL
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY MDM COMMANDS. IF THE CL OPEN WHILE THE SWITCH IS IN ANY POSTION, THE VAL THAT POSITION, CAN BE OPENED BY SWITCH OR MDM CO BE CLOSED BY SWITCH COMMANDS, ONLY BY MDM COMMANDS. FAILURE OF THE MDM CLOSE CAUSE THE INABILITY TO CLOSE THE VALVE.	LVE WILL REMAIN IN OMMANDS, AND CANNOT

DATE: 1/13, SUBSYSTEM: FRCS MDAC ID: 561	/87		TICALITY LIGHT: BORT:	HDW/FUNC 3/1R 2/1R
ITEM: OX 12 FAILURE MODE: SWI	& FU TK ISOL VLV TCH CLOSE CONTACT			NTACTS 11,
LEAD ANALYST: V.J.	BURKEMPER	SUBSYS LEAD:	D.J. PAUI	L
BREAKDOWN HIERARCH 1) ELECTRICAL CO 2) CONTROLS 3) PROP STOR & D 4) OX & FU TK ISC 5) OX & FU TK ISC 6) 7) 8) 9)	MPONENTS IST SUBSYSTEM	ICH CLOSE CON	TACTS 11,	12
	CRITICAL	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAF	HDW/FUNC 3/3 3/3 3/2R 3/1R		2/1R 3/1R 3/1R	2
REDUNDANCY SCREEN	S: A[2]	B [F]	С[Р]	
LOCATION: PNL PART NUMBER: 33V7	08 S24 3A8S24			

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE OTHER SWITCH CLOSE CONTACTS AND THE MDM CLOSE COMMANDS. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION AND CAN BE CLOSED BY SWITCH OR MDM COMMAND, BUT CANNOT BE OPENED BY SWITCH OR MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CLOSE CONTACTS, AND USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING ENTRY AND ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE:1/19/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/2RMDAC ID:562ABORT:3/3
ITEM: CONTROLLER, REMOTE POWER FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/2RAOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [2] B [P] C [P]
LOCATION: F BAY 3A, PCA 3

PART NUMBER: 83V76A24RPC29

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND SIGNAL TO OPEN MANIFOLD 5 FU & OX ISOL VLVS. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVS FAILED CLOSED RESULTING IN LOSS OF VRCS CONTROL.

REFERENCES: VS70-943099 REV B EO B12

DATE: 1/19/87 HIGE SUBSYSTEM: FRCS MDAC ID: 563	IEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: CONTROLLER, REMOTE POWER FAILURE MODE: FAILS HIGH			
LEAD ANALYST: V.J. BURKEMPER SUBSY	YS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)			
CRITICALITIES	3		
FLIGHT PHASE HDW/FUNC AI PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	BORT HDW/FUNC		
DRELAUNCH: 3/3	RTLS: 3/3		
	TAL: 3/3		
	AOA: 3/3		
	ATO: 3/3		
LANDING/SAFING: 3/3	,		
REDUNDANCY SCREENS: A [] B [] C[]		
LOCATION: F BAY 3A, PCA 3 PART NUMBER: 83V76A24RPC29			
CAUSES: CONTAMINATION, VIBRATION, PIEC	E PART FAILURE, OVERLOAD		
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE MANIFOLD 5 FU	U & OX ISOL VLVS BECOMING EFFECT, PROPELLANT CAN BE		

STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/19/87 H SUBSYSTEM: FRCS MDAC ID: 564	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: CONTROLLER, REMOTE POW FAILURE MODE: FAILS OPEN	ER	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)		
CRITICALIT	IES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3	
LANDING/SAFING: 3/3	ATO: 3/3	
REDUNDANCY SCREENS: A [] B	[] c []	
LOCATION: F BAY 3A, PCA 3 PART NUMBER: 83V76A24RPC28		
CAUSES: CONTAMINATION, VIBRATION, PIL	ECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: LOSE ABILITY TO COMMAND MANIFOLD 5 FU & OX ISOL VLVS CLOSE USING CREW SWITCH OR GPC. WORST CASE RESULTS IN MANIFOLD 5 FU & OX VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.		

REFERENCES: VS70-943099 REV B EO B12

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 565	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: CONTROLLER, REMOTE F FAILURE MODE: FAILS HIGH	POWER
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 3A, PCA 3 PART NUMBER: 83V76A24RPC28	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO COMMAND MANIFOLD 5 FU & OX ISOL VLVS USING GPC. CREW SWITCH CAN STILL OPEN OR CLOSE VLVS. LOSS OF ALL REDUNDANCY (CREW SWITCH), WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE CLOSED POSITION RESULTING IN LOSS OF VRCS CONTROL, THEREFORE LOSS OF MISSION CAPABILITY.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 566	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: CONTROLLER, REMOTE FAILURE MODE: FAILS OPEN	POWER
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/2R	RTLS: 3/3 TAL: 3/3 AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/3 LANDING (SAFING: 3/2	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 1, PCA 1 PART NUMBER: 81V76A22RPC28	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CREW SWITCH COMMAND SIGNAL TO OPEN MANIFOLD 5 FU & OX ISOL VLVS. VALVES CAN STILL BE OPENED USING GPC. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVS FAILED CLOSED RESULTING IN LOSS OF VRCS CONTROL.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 567	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: CONTROLLER, REMOTE PO FAILURE MODE: FAILS HIGH	WER
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) CONTROLLER, REMOTE POWER 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A []	
LOCATION: F BAY 1, PCA 1 PART NUMBER: 81V76A22RPC28	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE MANIFOLD STUCK IN THE OPEN POSITION. NO MISS ISOLATED FROM THRUSTERS BY THE TK IS	SION EFFECT, PROPELLANT CAN BE SOL 3/4/5 VLVS. VERNIER

THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 568	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR13	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE MANIFOLD ISOL 1 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 569	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>		
CRITICA	LITIES	
	ABORT HDW/FUNC	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3	
LIFTOFF: 3/3	TAL: $3/3$	
ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A []	B[] C[]	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR13		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN VALVE CONTROL FEEDBACK AND CREW SWITCH CLOSE COMMANDS WHEN THE MANIFOLD ISOL 1 VALVES ARE IN THE OPEN POSITION. THE EFFECT WOULD BE AN INTERMITTENT CLOSE COMMAND CAUSING THE VALVES TO FAIL PARTIALLY CLOSED WHEN COMMANDED OPEN BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL		

UTILIZING CREW SWITCH.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 570	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM	SUBSYS LEAD: D.J. PAUL
 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9) 	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR8	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 1 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 1 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/1RMDAC ID:571ABORT:2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:2/1RLIFTOFF:3/3TAL:3/1RONORBIT:3/2RAOA:3/1RDEORBIT:3/1RATO:3/1RLANDING/SAFING:3/33/3
REDUNDANCY SCREENS: A [3] B [P] C [P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76AlllAlCR8

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 1 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 572	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	-, -
REDUNDANCY SCREENS: A [] H	в[] с[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR12	

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 2 ISOL VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0420 REV C AMENDMENT SEQ. 8

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 573	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR12	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH (CLOSE POSITION) AND VALVE TALKBACK FROM HYBRID DRIVER. THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION. CORRECT VALVE POSITIONS AVAILABLE THROUGH GPC. NO IMPACT. VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.	

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 574	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:2/1RTAL:3/1RAOA:3/1RATO:3/1R
REDUNDANCY SCREENS: A [2]	B [P] C [P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR9	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 1 VALVE USING GPC COMMANDS. CREW SWITCH IS STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 1 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

SUBSYSTEMI FRUM	CICALITY HDW/FUNC LIGHT: 3/1R BORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTPRELAUNCH:3/3RTLS:LIFTOFF:3/3TAL:ONORBIT:3/2RAOA:PRODUT:2/1PATO:	HDW/FUNC
PRELAUNCH: 3/3 RTLS:	2/1R
LIFTOFF: 3/3 TAL:	3/1R
ONORBIT: 3/2R AOA:	3/1R
DEORBIT: 3/1R ATO:	3/1R 3/1R 3/1R 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3] B [P]	С[Р]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR9	
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SI SHOCK, OVERLOAD	HOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 1 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

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DATE: 1/26/87 SUBSYSTEM: FRCS	HIGHEST CRITICALITY FLIGHT:	HDW/FUNC 3/3
MDAC ID: 576	ABORT:	3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUI	Ľ.
BREAKDOWN HIERARCHY:		
1) ELECTRICAL COMPONENTS		
2) CONTROLS		
3) PROP STOR & DIST SUBSYSTEM		
4) MANIFOLD 1, OX & FU ISOL VLVS		

- 5) DIODE
- 6)
- 7)
- 8)
- 9)

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

REDUNDANCY SCREENS:	A	[]	B []	с []
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LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76AlllalCR5

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE MANIFOLD ISOL 1 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 577	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	$\mathbf{RTLS:} 3/3$
LIFTOFF: 3/3	$\frac{1}{1}$
ONORBIT: 3/3	AUA: 3/3
DEORBIT: 3/3 LANDING/SAFING: 3/3	A10. 375
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR5	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN VALVE SWITCH OPEN COMMANDS WHEN THE MANI CLOSE POSITION. THE EFFECT WOULD F CAUSING THE VALVES TO FAIL PARTIAL	FOLD ISOL 1 VALVES ARE IN THE BE AN INTERMITTENT OPEN COMMAND

CAUSING THE VALVES TO FAIL PARTIALLY OPEN WHEN COMMANDED CLOSED BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL UTILIZING CREW SWITCH.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 578	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HOW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	3[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR6	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE:	

LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 2 ISOL VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 579	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR6 CAUSES: CONTAMINATION, VIBRATION,	MECHANICAL SHOCK, THERMAL
SHOCK, OVERLOAD	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW VALVE TALKBACK FROM HYBRID DRIVER. FALSE INDICATION OF A VALVE MISCOM PLACED IN THE OPEN POSITION. CORRECT VALVE POSITIONS AVAILABLE POSITION TALKBACKS ARE NOT MISSION	THE FAILURE WILL RESULT IN A IPARE WHEN THE CREW SWITCH IS THROUGH GPC. NO IMPACT, VALVE
	201

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:580ABORT:3/3	
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3	
REDUNDANCY SCREENS: A [] B [] C []	

LOCATION: PNL 08 DS16 PART NUMBER: 33V73A8CR5

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

EFFECTS/RATIONALE:

THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE MANIFOLD ISOL 1 VALVES ARE COMMANDED OPEN. CORRECT VALVE POSITION AVAILABLE GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 581 ITEM: DIODE FAILURE MODE: FAILS SHORT	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RILD. J/J
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL 08 DS16 PART NUMBER: 33V73A8CR5	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STIL	L AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 582 ITEM: DIODE FAILURE MODE: FAILS ODEN	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: PNL 08 DS16	

PART NUMBER: 33V73A8CR6

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

EFFECTS/RATIONALE:

THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE MANIFOLD ISOL 1 VALVES ARE COMMANDED CLOSED. CORRECT VALVE POSITION AVAILABLE GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:583ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
UNURBII: 3/3
DEORBIT: 3/3 ATO: 5/5 LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 DS16 PART NUMBER: 33V73A8CR6
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 HI SUBSYSTEM: FRCS MDAC ID: 584	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUB	SYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS	
2) CONTROLS	
3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS	
5) DIODE	
6)	
7) 8)	
9)	
CRITICALITIE	
	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] c []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR10	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 1 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 1 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 585	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 1, MCA 1	

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

EFFECTS/RATIONALE:

PART NUMBER: 81V76A111A1CR10

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 1 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 586	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] F	3[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR7	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 1 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 1 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 587	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R		
ITEM: DIODE FAILURE MODE: FAILS SHORT			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PACL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)			
CRITICAL	JITIES		
FLICHT PHASE HDW/FUNC	ABORT HDW/FUNC		
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R	RTLS: 2/1R TAL: 3/1R		
$1.1 \pm 1.1 $	TAL: $3/1R$		
ONORBIT: 3/2R	AOA: 3/1R		
LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	ATO: 3/1R		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A [3]	B[P] C[P]		
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR7			
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL			

FAILURE COULD POS OX & FU MANIFOLD ISOL 1 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 588	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	SUBSYS LEAD: D.J. PAUL
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] c[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR11	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 1 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 1 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/1RMDAC ID:589ABORT:2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
$\mathbf{RTLS}: 2/1\mathbf{R}$
LIFTOFF: 3/3 TAL: 3/1R
ONORBIT: 3/2R AUA: 5/1R
DEORBIT: 3/1R ATO: 3/1R
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [3] B [P] C [P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1CR11

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 1 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 HIG SUBSYSTEM: FRCS MDAC ID: 590	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBS	SYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALITIE	S
FLIGHT PHASE HDW/FUNC A	BORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR1	
CAUSES: CONTAMINATION, VIBRATION, MECHA SHOCK, OVERLOAD	ANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE MANIFOLD ISOL 2 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 591	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: DIODE FAILURE MODE: FAILS SHORT			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)			
CRITICA	TTTTC		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3		
REDUNDANCY SCREENS: A []	в[] С[]		
LOCATION: F BAY 2; MCA 2 PART NUMBER: 82V76All2AlCR1			
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD			
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN VALVE CONTROL FEEDBACK AND CREW SWITCH CLOSE COMMANDS WHEN THE MANIFOLD ISOL 2 VALVES ARE IN THE OPEN POSITION. THE EFFECT WOULD BE AN INTERMITTENT CLOSE COMMAND CAUSING THE VALVES TO FAIL PARTIALLY CLOSED WHEN COMMANDED OPEN BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL UTILIZING CREW SWITCH.			

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 592		TICALITY HDW/FUNC LIGHT: 3/1R BORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD:	D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>		
CRITICAL	TTTES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [2]	B [P]	С[Р]

LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR9

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 2 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 2 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 593	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R		
ITEM: DIODE FAILURE MODE: FAILS SHORT			
LEAD ANALYST: V.J. BURKEMPER SU	JBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)			
CRITICALI	ries		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 2/1R		
LIFTOFF: 3/3	TAL: $3/1R$		
ONORBIT: 3/2R	AOA: 3/1R		
DEORBIT: 3/1R	ATO: 3/1R		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A [3]	3[P] C[P]		
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR9			
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD			
EFFECTS/RATIONALE:			

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

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DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 594	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: DIODE FAILURE MODE: FAILS OPEN			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)			
CRITICAL	LITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: 3/3		
ONORBIT: 3/3	AOA: 3/3		
DEORBIT: 3/3	ATO: 3/3		
LANDING/SAFING: 3/3	A10. 5/3		
REDUNDANCY SCREENS: A []	В[] С[]		
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR2			
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD			
EFFECTS / RATTONALE.			

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 2 ISOL VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0420 REV C AMENDMENT SEQ. 8

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 595			TICALITY FLIGHT: ABORT:	3/3
ITEM: DIODE FAILURE MODE: FAILS SI				
LEAD ANALYST: V.J. BUR	KEMPER	SUBSYS LEAD	D: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)				
	CRITICAL	TTIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING (SAFING:	HDW/FUNC	ABORT	HDW/FUN	C
DEFI MINCH.	3/3	RTLS	: 3/3	
TEMORE.	3/3	TAL:	3/3	
LIFTOFF:	3/3	AOA:	3/3	
ONORBIT:	2/2	Δ ΤΟ:	3/3	
DEORBIT:	3/3	UIA.	•,•	
LANDING/SAFING:	3/3			
REDUNDANCY SCREENS:	A []	В[]	с[]	
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR2				
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD				
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH (CLOSE POSITION) AND VALVE TALKBACK FROM HYBRID DRIVER. THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION.				
CORRECT VALVE POSITIONS AVAILABLE THROUGH GPC. NO IMPACT. VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.				

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 596		FICALITY HDW/FUNC LIGHT: 3/1R BORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)		
CRITICAL	ITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [2]	B[P]	С[Р]

LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR8

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 2 VALVE USING GPC COMMANDS. CREW SWITCH IS STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 2 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 HI SUBSYSTEM: FRCS MDAC ID: 597	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALIT	TES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3] B	[P] C[P]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR8	

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 598	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER SU	JBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASE HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3	
LIFTOFF: 3/3	TAL: 3/3	
LIFTOFF: 3/3 ONORBIT: 3/3	AOA: 3/3	
DEORBIT: 3/3	ATO: 3/3	
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	AIO. 5/5	
REDUNDANCY SCREENS: A [] B	[] C[]	
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR6		
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE MANIFOLD ISOL 2 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE		

GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:599ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR6

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN VALVE CONTROL FEEDBACK AND CREW SWITCH OPEN COMMANDS WHEN THE MANIFOLD ISOL 2 VALVES ARE IN THE CLOSE POSITION. THE EFFECT WOULD BE AN INTERMITTENT OPEN COMMAND CAUSING THE VALVES TO FAIL PARTIALLY OPEN WHEN COMMANDED CLOSED BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL UTILIZING CREW SWITCH.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 600	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []]	в[] с[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76All2AlCR5	
CAUSES: CONTAMINATION VIBRATION N	FCUNNTCNI SHOOT MURDAN

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 2 ISOL VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/26/87 HIG SUBSYSTEM: FRCS MDAC ID: 601	HEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SUBS	SYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>	
CRITICALITI	ES
TTCUT DUASE HOW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	
LIFTOFF: 3/3	TAL: 3/3
	AOA: 3/3
ONORBIT: 3/3	ATO: 3/3
DEORBIT: 3/3	Alo: 0/0
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR5	
CAUSES: CONTAMINATION, VIBRATION, MEC SHOCK, OVERLOAD	HANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWIT TALKBACK FROM HYBRID DRIVER. THE FAIL INDICATION OF A VALVE MISCOMPARE WHEN THE OPEN POSITION. CORRECT VALVE POSITIONS AVAILABLE THRO POSITION TALKBACKS ARE NOT MISSION CRI	THE CREW SWITCH IS PLACED IN NUGH GPC. NO IMPACT. VALVE

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 602	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] H	з[] с[]

LOCATION: PNL 08 DS17 PART NUMBER: 33V73A8CR7

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

EFFECTS/RATIONALE:

THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE MANIFOLD ISOL 2 VALVES ARE COMMANDED OPEN. CORRECT VALVE POSITION AVAILABLE GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

The lease

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 603		HIGHES	T CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/3 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT				
LEAD ANALYST: V.J. BURKEMP	ER	SUBSYS	LEAD: D.J. PA	UL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBS 4) MANIFOLD 2, OX & FU IS 5) DIODE 6) 7) 8) 9)	STEM			
	CRITICA			
FLIGHT PHASE HDW/	FUNC	ABOR	T HDW/FU	NC
PRELAUNCH: 3/	3	R	TLS: 3/3	
LIFTOFF: 3/	3	T	AL: 3/3	
ONORBIT: 3/	3 3 3	A	IOA: 3/3	
DEORBIT: 3/	3	A	ATO: 3/3	
LANDING/SAFING: 3/	3			
REDUNDANCY SCREENS: A []	в[]	c[]	
LOCATION: PNL 08 DS17 PART NUMBER: 33V73A8CR7				
CAUSES: CONTAMINATION, VI SHOCK, OVERLOAD	BRATION,	MECHANI	CAL SHOCK, TH	ERMAL
EFFECTS/RATIONALE:				

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 604	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]

LOCATION: PNL 08 DS17 PART NUMBER: 33V73A8CR8

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

EFFECTS/RATIONALE:

THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE MANIFOLD ISOL 2 VALVES ARE COMMANDED CLOSED. CORRECT VALVE POSITION AVAILABLE GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:605ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 DS17 PART NUMBER: 33V73A8CR8
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:606ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: $3/3$ ATO: $3/3$
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76All2AlCR7
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 2 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 2 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 607	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICA	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]

LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR7

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 608	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [] B) [] c[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR4	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE:	

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 2 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 2 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

REFERENCES: VS70-942099 REV D EO DO1

C - 7

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 609	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICA	TTATES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]

LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR4

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 610	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	TTTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76All2AlCR3	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	AECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ABILITY TO CLOSE THE FU & OX MA	NIFOLD ISOL 2 VALVE USING CREW

S AD. ro c SWITCH. GPC COMMANDS ARE STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 2 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

ORDITER DODDED	
DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 611	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
07.707.03	LITIES
CRITICA	HDW/FUNC
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 2/1R
1.TFTOFF: 3/3	TAL: 3/1R
ONORBIT: 3/2R	AOA: 3/1R
	ATO: 3/1R
CRITICA FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	
LANDING/ BAPING! 0/0	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1CR3	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 2 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.	

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:612ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR7
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE MANIFOLD ISOL 3 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

REFERENCES: VS70-942099 REV D EO DO1

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DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 613	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)		
CRITICA	I.TTIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR7		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN VALVE CONTROL FEEDBACK AND CREW SWITCH CLOSE COMMANDS WHEN THE MANIFOLD ISOL 3 VALVES ARE IN THE OPEN POSITION. THE EFFECT WOULD BE AN INTERMITTENT CLOSE COMMAND CAUSING THE VALVES TO FAIL PARTIALLY CLOSED WHEN COMMANDED OPEN BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL UTILIZING CREW SWITCH.		

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 614	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [2] E	3[P] C[P]
LOCATION: F BAY 3A, MCA 3	

PART NUMBER: 83V76A113A1CR33

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 3 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 3 VALVE FAILING CLOSED CASE. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF LIFE/VEHICLE) OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 615	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R TAL: 3/1R AOA: 3/1R
LIFTOFF: 3/3 ONORBIT: 3/2R	AOA: 3/1R
ONORBIT: 3/2R DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR33	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 3 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:616ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3
ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3
DEORBIT: $3/3$ ATO: $3/3$
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR8
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 4 ISOL VALVE TO DE- ENERGIZE RELAY ONCE THE VALVE PEACHES THE COMMANDED DOCUMENTON

ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0420 REV C AMENDMENT SEQ. 8

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DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 617	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR8	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	, MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH (CLOSE POSITION) AND VALVE TALKBACK FROM HYBRID DRIVER. THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE CREW SWITCH IS PLACED IN THE CLOSE POSITION. CORRECT VALVE POSITIONS AVAILABLE THROUGH GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.	

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 618	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VI 5) DIODE 6) 7) 8) 9)	vs
CRITI	CALITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1R	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR37

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 3 VALVE USING GPC COMMANDS. CREW SWITCH IS STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 3 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 619	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR37	

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 3 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 620	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS	
5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	3[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR34	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ABILITY TO OVERRIDE A GPC "CLOS	E" COMMAND AND OPEN THE

LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE MANIFOLD ISOL 3 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 621	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>		
CRITICAL	ITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3	
LIFTOFF: 3/3	TAL: $3/3$	
ONORBIT: 3/3		
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A []	B[] C[]	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR34		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN VALVE CONTROL FEEDBACK AND CREW SWITCH OPEN COMMANDS WHEN THE MANIFOLD ISOL 3 VALVES ARE IN THE CLOSE POSITION. THE EFFECT WOULD BE AN INTERMITTENT OPEN COMMAND CAUSING THE VALVES TO FAIL PARTIALLY OPEN WHEN COMMANDED		

CAUSING THE VALVES TO FAIL PARTIALLY OPEN WHEN COMMANDED CLOSED BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL UTILIZING CREW SWITCH.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 622	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	В[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR38	

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 4 ISOL VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 623	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: SAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)		
CRITICA	LITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR38		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH (OPEN POSITION) AND VALVE TALKBACK FROM HYBRID DRIVER. THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE CREW SWITCH IS PLACED IN THE OPEN POSITION. CORRECT VALVE POSITIONS AVAILABLE THROUGH GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.		

DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 624	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALIT	TEC
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (SAFING: 2/2	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [[]] C[]
LOCATION: PNL 08 DS18 PART NUMBER: 33V73A8CR9	
CAUSES: CONTAMINATION, VIBRATION, PIE	CE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: THE FAILURE WILL RESULT IN A FALSE IND MISCOMPARE WHEN THE MANIFOLD ISOL 3 VA CORRECT VALVE POSITION AVAILABLE GPC. TALKBACKS ARE NOT MISSION CRITICAL	LVES ARE COMMANDED OPEN.

TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 625	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 3/3
PRELAUNCH: 3/3	TAL: $3/3$
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3 AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL 08 DS18 PART NUMBER: 33V73A8CR9	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 HI SUBSYSTEM: FRCS MDAC ID: 626	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: DIODE FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)		
CRITICALITIES		
	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
REDUNDANCY SCREENS: A [] B [] c[]	
LOCATION: PNL O8 DS18 PART NUMBER: 33V73A8CB10		

PART NUMBER: 33V73A8CR10

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE MANIFOLD ISOL 3 VALVES ARE COMMANDED CLOSED. CORRECT VALVE POSITION AVAILABLE GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

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DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:627ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: $3/3$ ATO: $3/3$
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 DS18 PART NUMBER: 33V73A8CR10
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:628ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3,

PART NUMBER: 83V76A113A1CR14

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 3 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 3 AND TK ISO 3/4/5 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 629	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R TAL: 3/1R AOA: 3/1R
LIFTOFF: 3/3	TAL: 3/1R
ONORBIT: 3/2R	AOA: 3/1R
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3, PART NUMBER: 83V76A113A1CR14	
CAUSES: CONTAMINATION, VIBRATION,	MECHANICAL SHOCK, THERMAL

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 3 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:630ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3, PART NUMBER: 83V76A113A1CR11

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 3 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 3 AND TK ISO 3/4/5 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 631	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION F BAY 34. MCA 3.	

LOCATION: F BAY 3A, MCA 3, PART NUMBER: 83V76A113A1CR11

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 3 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:632ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3

PART NUMBER: 83V76A113A1CR10

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 3 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 3 AND TK ISO 3/4/5 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 633	HIGHEST CRITICALITY FLIGHT: ABORT:	
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PA	AUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)		
CRITICAI	LITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW/FT RTLS: 2/11 TAL: 3/11 AOA: 3/11 ATO: 3/11	R R R
REDUNDANCY SCREENS: A [3]	В[Р] С[Р]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR10

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 3 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

	W/FUNC 3/3 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC	
PRELAUNCH: 3/3 RTLS: 3/3	
LIFTOFF: 3/3 TAL: 3/3	
ONORBIT: 3/3 AOA: 3/3	
DEORBIT: 3/3 ATO: 3/3	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR16	
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAN SHOCK, OVERLOAD	L

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "OPEN" COMMAND AND CLOSE THE MANIFOLD ISOL 4 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 635	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR16	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN VALVE SWITCH CLOSE COMMANDS WHEN THE MAN	CONTROL FEEDBACK AND CREW IFOLD ISOL 4 VALVES ARE IN THE

SWITCH CLOSE COMMANDS WHEN THE MANIFOLD ISOL 4 VALVES ARE IN THE OPEN POSITION. THE EFFECT WOULD BE AN INTERMITTENT CLOSE COMMAND CAUSING THE VALVES TO FAIL PARTIALLY CLOSED WHEN COMMANDED OPEN BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL UTILIZING CREW SWITCH.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 636	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:2/1RTAL:3/1RAOA:3/1RATO:3/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3	

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR36

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 4 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 4 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 637	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR36	

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 4 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 638	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR15

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 1 ISOL VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

REFERENCES: VS70-942099 REV D EO DO1; MC284-0420 REV C AMENDMENT SEQ. 8

ORDITER BODDEDEEN	
DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 639	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
COTUTCA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR15 CAUSES: CONTAMINATION, VIBRATION,	MECHANICAL SHOCK, THERMAL
SHOCK, OVERLOAD	
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW VALVE TALKBACK FROM HYBRID DRIVER. FALSE INDICATION OF A VALVE MISCOM PLACED IN THE CLOSE POSITION. CORRECT VALVE POSITIONS AVAILABLE POSITION TALKBACKS ARE NOT MISSION	THE FAILURE WILL RECEIPT IN THE PARE WHEN THE CREW SWITCH IS THROUGH GPC. NO IMPACT, VALVE

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 640	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	JITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR30	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 4 VALVE USING GPC COMMANDS. CREW SWITCH IS STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 4 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 641	HIGHEST CRITICAL FLIGHT ABORT:	: 3/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J.	PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>		
CRITICAL	TTTES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	ABORT HDW RTLS: 2 TAL: 3 AOA: 3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR30		

CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL

SHOCK, OVERLOAD

EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "OPEN" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 4 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 642	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	ABORI HDW/FORC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	·
REDUNDANCY SCREENS: A [] B	3[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR35	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE ABILITY TO OVERRIDE A GPC "CLOSE" COMMAND AND OPEN THE MANIFOLD ISOL 4 VALVE USING CREW SWITCH. NO EFFECT ON MISSION, GPC COMMANDS STILL AVAILABLE TO CLOSE VALVE.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 643	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT ADW/FORC RTLS: 3/3 TAL: 3/3 AOA: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AUA: 3/3 ATO: 3/3
DEORBIT: 3/3 LANDING/SAFING: 3/3	A10. 373
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR35	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN VALVE CONTROL FEEDBACK AND CREW SWITCH OPEN COMMANDS WHEN THE MANIFOLD ISOL 4 VALVES ARE IN THE CLOSE POSITION. THE EFFECT WOULD BE AN INTERMITTENT OPEN COMMAND CAUSING THE VALVES TO FAIL PARTIALLY OPEN WHEN COMMANDED CLOSED BY GPC. NO MISSION EFFECT, VALVES ARE FULLY OPERATIONAL UTILIZING CREW SWITCH.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 644	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR29	
CAUSES: CONTAMINATION, VIBRATION, I SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE CONTROL FEEDBACK FROM FU & OX MANIFOLD 1 ISOL VALVE TO DE-ENERGIZE RELAY ONCE THE VALVE REACHES THE COMMANDED POSITION. NO EFFECT ON MISSION, AC MOTOR VALVE DESIGNED TO WITHSTAND CONTINUOUS POWER.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:645ABORT:3/3		
ITEM: DIODE FAILURE MODE: FAILS SHORT		
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A		
REDUNDANCY SCREENS: A [] B [] C []		
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR29		
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE DIODE ISOLATION BETWEEN CREW SWITCH (OPEN POSITION) AND VALVE TALKBACK FROM HYBRID DRIVER. THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE CREW SWITCH IS PLACED IN THE OPEN POSITION. CORRECT VALVE POSITIONS AVAILABLE THROUGH GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.		
REFERENCES: VS70-942099 REV D EO DO1		

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 646	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL 08 DS19	

PART NUMBER: 33V73A8CR11

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE MANIFOLD ISOL 4 VALVES ARE COMMANDED OPEN. CORRECT VALVE POSITION AVAILABLE GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 647	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FONC RTLS: 3/3
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL 08 DS19 PART NUMBER: 33V73A8CR11	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STII	LL AVAILABLE TO GPC & CREW.

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DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 648	IIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALITI	TES
	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B [] c[]
LOCATION: PNL 08 DS19 PART NUMBER: 33V73A8CR12	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE WILL RESULT IN A FALSE INDICATION OF A VALVE MISCOMPARE WHEN THE MANIFOLD ISOL 4 VALVES ARE COMMANDED CLOSED. CORRECT VALVE POSITION AVAILABLE GPC. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/23/87 C-550

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 649	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
DOFININCH 3/3	RTLS: 3/3
	TAL: 3/3
	AOA: 3/3
	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: PNL 08 DS19 PART NUMBER: 33V73A8CR12	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STIL	L AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 650	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR9	
CAUSES: CONTAMINATION, VIBRATION, N SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 4 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 4 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 651	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $3/1R$
ONORBIT: 3/2R	AUA: J/IN
DEORBIT: 3/1R	ATO: 3/1R
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR9	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 4 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:652ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR12
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 4 VALVE USING ONE OF TWO GPC COMMANDS. OTHER GPC COMMAND AND CREW SWITCH STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 4 AND TK ISOL 1/2 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 653	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76All3AlCR12

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 4 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:654ABORT:3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, MCA 3

PART NUMBER: 83V76A113A1CR13

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

EFFECTS/RATIONALE:

LOSE ABILITY TO CLOSE THE FU & OX MANIFOLD ISOL 4 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE TO CLOSE VALVE. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 4 AND TK ISO 3/4/5 VALVES FAILING OPEN. THE EFFECT WOULD BE AN INABILITY TO ISOLATE TANK FROM MANIFOLD, NO MISSION IMPACT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 655	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAI	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [3]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1CR13	

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

EFFECTS/RATIONALE:

LOSE DIODE ISOLATION BETWEEN CREW SWITCH AND GPC "CLOSE" COMMAND. FAILURE COULD POSSIBLY RESULT IN LOSS OF GPC OR SWITCH TO CONTROL OX & FU MANIFOLD ISOL 4 VALVE OPERATION. LOSS OF ALL REDUNDANCY, WORST CASE, CAN RESULT IN THE MANIFOLD ISOL VALVE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 656 ITEM: DIODE FAILURE MODE: FAILS OPEN	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18CR J1-93	
CAUSES: CONTAMINATION, VIBRATION,	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE ABILITY TO COMMAND MANIFOLD 5 FU & OX ISOL VLVS CLOSE USING GPC. CREW SWITCH CAN STILL OPEN OR CLOSE VLVS. WORST CASE RESULTS IN MANIFOLD 5 FU & OX VLVs BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVs. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 657	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER S	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] E	3[] C[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18CR J1-93	
CAUSES: CONTAMINATION, VIBRATION, M	ECHANICAL SHOCK, THERMAL

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

EFFECTS/RATIONALE:

LOSE ISOLATION BETWEEN CREW SWITCH AND GPC CLOSE COMMANDS. THE FAILURE CAN RESULT IN LOSS OF GPC OR CREW SWITCH TO OPERATE THE MANIFOLD 5 FU & OX ISOL VLVS. WORST CASE RESULTS IN MANIFOLD 5 FU & OX VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 658	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	6 [] c []
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18CR J2-87	
CAUSES: CONTAMINATION, VIBRATION, M	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE ISOLATION BETWEEN CREW SWITCH AND GPC CLOSE COMMANDS. THE FAILURE CAN RESULT IN LOSS OF GPC OR CREW SWITCH TO OPERATE THE MANIFOLD 5 FU & OX ISOL VLVS. WORST CASE RESULTS IN MANIFOLD 5 FU & OX VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 659	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	$\begin{array}{ccc} \text{RTLS:} & 3/3 \\ \text{mat} & 2/2 \end{array}$
LIFTOFF: 3/3	$\frac{1}{1}$
ONORBIT: 3/3	AUA: $3/3$
DEORBIT: 3/3	ATU: 5/5
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18CR J2-87	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ISOLATION BETWEEN CREW SWITCH	AND GPC CLOSE COMMANDS. THE

LOSE ISOLATION BETWEEN CREW SWITCH AND GPC CLOCH TO OPERATE THE FAILURE CAN RESULT IN LOSS OF GPC OR CREW SWITCH TO OPERATE THE MANIFOLD 5 FU & OX ISOL VLVS. WORST CASE RESULTS IN MANIFOLD 5 FU & OX VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 660	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	TIES
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
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [2] E	3 [P] C [P]
LOCATION: F BAY 1, PCA 1 PART NUMBER: 81V76A22CR14	
CAUSES: CONTAMINATION, VIBRATION, ME SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE CREW SWITCH COMMAND SIGNAL TO OPEN MANIFOLD 5 FU & OX ISOL VLVS. VALVES CAN STILL BE OPENED USING GPC. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVS FAILED CLOSED RESULTING IN LOSS OF VRCS CONTROL.

DATE: 1/19/87 HI SUBSYSTEM: FRCS MDAC ID: 661	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SUE	SYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
LIFTOFF: 3/3 ONORBIT: 3/2R	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [3] B	[P] C[P]
LOCATION: F BAY 1, PCA 1 PART NUMBER: 81V76A22CR14	
CAUSES: CONTAMINATION, VIBRATION, MEC SHOCK, OVERLOAD	HANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE ISOLATION BETWEEN MAIN BUSES WHEN THE GPC CMDS THE MANIFOLD 5 FU & OX ISOL VLVS OPEN. THE WORST CASE EFFECT IS LOSS OF THE GPC OR CREW SWITCH "OPEN" CMD. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN THE MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE CLOSE POSITION RESULTING IN LOSS OF VRCS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 662	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7)</pre>	
8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [2]	B[P] C[P]

LOCATION: F BAY 1, PCA 1 PART NUMBER: 81V76A22CR38

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

EFFECTS/RATIONALE:

LOSE GPC COMMAND SIGNAL TO OPEN MANIFOLD 5 FU & OX ISOL VLVS. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVs FAILED CLOSED RESULTING IN LOSS OF VRCS CONTROL.

DATE: 1/19/87 H SUBSYSTEM: FRCS MDAC ID: 663	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER SU	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALI	TIES
CRITICALL' FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/3 LINDING (SAFING: 3/3	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 [3]	В[Р] С[Р]
LOCATION: F BAY 1, PCA 1 PART NUMBER: 81V76A22CR38	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ISOLATION BETWEEN MAIN BUSES WE MANIFOLD 5 FU & OX ISOL VLVS OPEN. OF THE GPC OR CREW SWITCH "OPEN" CMI	

MANIFOLD 5 FU & OX ISOL VLVS OPEN. THE WORDT CHEL REDUNDANCY, OF THE GPC OR CREW SWITCH "OPEN" CMD. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN THE MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE CLOSE POSITION RESULTING IN LOSS OF VRCS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 664	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICALIT	les
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
LANDING/SAFING: 3/3	ATO: 3/3
HANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	
LOCATION: PNL 08 DS20 PART NUMBER: 33V73A8CR13	
CAUSES: CONTAMINATION, VIBRATION, ME SHOCK, OVERLOAD	CHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE MANIFOLD 5 FU & OX VLV POSITION VALVE POSITION TALKBACK NOT MISSION C TO CREW INDICATOR.	(OPEN) TALKBACK TO GPC. RITICAL. THIS IS HARDWIRED

SUBSYSTEM: FRCS MDAC ID: 665	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LINDING (CAELING: 2/2	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	$\mathbf{RTLS:} 3/3$
LIFTOFF: 3/3	$\frac{1}{2}$
ONORBIT: 3/3	AUA: 3/3
LANDING/SAFING: 3/3	A10. 5/5
LANDING/SAFING. 5/5	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: PNL 08 DS20 PART NUMBER: 33V73A8CR13	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILA	BLE.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 666	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []]	в[] с[]
LOCATION: PNL 08 DS20 PART NUMBER: 33V73A8CR14	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE MANIFOLD 5 FU & OX VLV POSITIO VALVE POSITION TALKBACK NOT MISSION CREW INDICATOR.	ON (CLOSED) TALKBACK TO GPC. CRITICAL. THIS IS HARDWIRED TO
REFERENCES: VS70-943099 REV B EO BI	12

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DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 667	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DIODE FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DIODE 6) 7) 8) 9)	
CRITICAL	LITIES UDW/FUNC
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: PNL O8 DS20 PART NUMBER: 33V73A8CR14	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILA	BLE.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 668	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALI	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B	[] c []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111AR2 TYPE I	
CAUSES: CONTAMINATION, VIBRATION, PI	ECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 1 VALVES (OPEN POSITION). DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED OPEN. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 669	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	LTTTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111AR2 TYPE I	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE CONTROL FEEDBACK FROM MANIFOLD ISOL 1 VALVES (OPEN POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE OPEN COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN CLOSED POSITION. THE EFFECT, AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 670	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] H	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111AR1 TYPE I	
CAUSES: CONTAMINATION, VIBRATION, H	PIECE PART FAILURE, OVERLOAD
FFFFCTS /DATTONALE.	

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 1 VALVES (CLOSE POSITION). DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED CLOSED. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 671	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER S	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALI	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	e[] c[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111AR1 TYPE I	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE CONTROL FEEDBACK FROM MANIFOLD ISOL 1 VALVES (CLOSE POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE CLOSE COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN OPEN POSITION. NO MISSION EFFECT, VALVES ARE NORMALLOY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 1 FROM THE PROPELLANT TANKS, NO IMPACT ON MISSION.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 672	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112AR1 TYPE I	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:	
LOSE CONTROL FEEDBACK FROM THE FU &	
(OPEN POSITION). DUAL EFFECT: FIRE	
AUTOMATICALLY BE DE-ENERGIZED ONCE	
COMMANDED POSITION AND SECOND THE C	
INDICATE A VALVE MISMATCH WHEN THE	VALVES ARE COMMANDED OPEN. NO

INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED OPEN. NO IMPACT ON MISSION. VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 673	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	DI PAUL
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
	RTLS: 1/1
LIFTOFF: 3/3	TAL: $2/1R$
LIFTOFF: 3/3 ONORBIT: 3/2R	RTLS: 1/1 TAL: 2/1R AOA: 2/1R
DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[F] C[P]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76All2AR1 TYPE I	DIRCE DART FAILURE, OVERLOAD

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE: THE CONTROL FEEDBACK FROM MANIFOLD ISOL 2 VALVES (OPEN POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE OPEN COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN CLOSED POSITION. THE EFFECT, AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 674	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALI	TTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112AR2 TYPE I	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 2 VALVES (CLOSE POSITION). DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED CLOSED. NO IMPACT ON MISSION. VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 675	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAI	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 2, MCA 2	

PART NUMBER: 82V76A112AR2 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE CONTROL FEEDBACK FROM MANIFOLD ISOL 2 VALVES (CLOSE POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE CLOSE COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN OPEN POSITION. NO MISSION EFFECT, VALVES ARE NORMALLOY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 2 FROM THE PROPELLANT TANKS, NO IMPACT ON MISSION.

DATE: 1/26/87 HI SUBSYSTEM: FRCS MDAC ID: 676	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUB	SYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3	
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: F BAY 3A, MCA 3	

PART NUMBER: 83V76A113AR4 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 3 VALVES (OPEN POSITION). DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED OPEN. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 677		ICALITY HDW/FUNC IGHT: 2/lR ORT: 1/l
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD:	D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)		
CRITICAI	LITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:2/1RLANDING/SAFING:3/3	ABORT RTLS: TAL: AOA: ATO:	HDW/FUNC 1/1 2/1R 2/1R 2/1R 2/1R
REDUNDANCY SCREENS: A [2]	B [F]	C [P]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR4 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE CONTROL FEEDBACK FROM MANIFOLD ISOL 3 VALVES (OPEN POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE OPEN COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN CLOSED POSITION. THE EFFECT, AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 678	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A. MCA 3	

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR3 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 3 VALVES (CLOSE POSITION). DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED CLOSED. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 679	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VI 5) DRIVER, HYBRID 6) 7) 8) 9)	
	ICALITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR3 TYPE	I
CAUSES: CONTAMINATION, VIBRATI	ON, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE CONTROL FEEDBACK FROM MANIFOLD ISOL 3 VALVES (CLOSE POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE CLOSE COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN OPEN POSITION. NO MISSION EFFECT, VALVES ARE NORMALLOY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 3 FROM THE PROPELLANT TANKS, NO IMPACT ON MISSION.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 680	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	JITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	ABORT HDW/FUNC RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR6 TYPE I	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 4 VALVES (OPEN POSITION). DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED OPEN. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 HIGHEST CRITICALITY SUBSYSTEM: FRCS FLIGHT: MDAC ID: 681 ABORT: ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	HDW/FUNC 2/1R 1/1
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUI	L.
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC	2
PRELAUNCH: 3/3 RTLS: 1/1	
PRELAUNCH: 3/3 RTLS: 1/1 LIFTOFF: 3/3 TAL: 2/1R	
ONORBIT: 3/2R AOA: 2/1R	
LIFTOFF:3/3TAL:2/1RONORBIT:3/2RAOA:2/1RDEORBIT:2/1RATO:2/1R	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2] B [F] C [P]	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113AR6 TYPE I	
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OV	/ERLOAD
EFFECTS/RATIONALE:	

THE CONTROL FEEDBACK FROM MANIFOLD ISOL 4 VALVES (OPEN POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE OPEN COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN CLOSED POSITION. THE EFFECT, AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS OR AN INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 682	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3	

PART NUMBER: 83V76A113AR5 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 4 VALVES (CLOSE POSITION). DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH WHEN THE VALVES ARE COMMANDED CLOSED. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINUOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 683	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	TTTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3	

PART NUMBER: 83V76A113AR5 TYPE I

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE CONTROL FEEDBACK FROM MANIFOLD ISOL 4 VALVES (CLOSE POSITION) CONTINUALLY HIGH CAUSING LOSS OF ALL VALVE CLOSE COMMANDS. THE FINAL RESULT WOULD BE THE ISOL VALVES STUCK IN OPEN POSITION. NO MISSION EFFECT, VALVES ARE NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 1 FROM THE PROPELLANT TANKS, NO IMPACT ON MISSION.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 684 ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: F BAY 3A, LCA 2 PART NUMBER: 83V76A18AR J4-71 TYPE I	
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: LOSE ABILITY TO COMMAND MANIFOLD 5 FU & OX ISOL VLVS CLOSE USING CREW SWITCH OR GPC. WORST CASE RESULTS IN MANIFOLD 5 FU & OX VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.	

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 685	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/3 LANDING (SAFINC: 3/3	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: F BAY 3A, LCA 2 PART NUMBER: 83V76A18AR J4-71 TYP	EI
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CAPABILITY TO COMMAND MANIFOLD 5 FU & OX ISOL VLVS USING GPC. CREW SWITCH CAN STILL OPEN OR CLOSE VLVS. LOSS OF ALL REDUNDANCY (CREW SWITCH), WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE CLOSED POSITION RESULTING IN LOSS OF VRCS CONTROL, THEREFORE LOSS OF MISSION CAPABILITY.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 686	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:3/3LANDING/SAFING:3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18AR J4-51 TYPE	I
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE GPC COMMAND SIGNAL TO OPEN MANIFOLD 5 FU & OX ISOL VLVS. VALVES CAN STILL BE OPENED USING CREW SWITCH. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVS FAILED CLOSED RESULTING IN LOSS OF VRCS CONTROL.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 687	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	$\begin{array}{ccc} \text{RTLS:} & 3/3 \\ \text{TDI} & 2/2 \end{array}$
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18AR J4-51 TYPE	I
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN THE MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 688	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
ONORBIT: 3/3	$\begin{array}{ccc} \mathbf{TAL:} & \mathbf{3/3} \\ \mathbf{\lambda} \mathbf{\Omega} \mathbf{\lambda} & \mathbf{3/3} \end{array}$
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A16AR J4-48 TYPE	I
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: LOSE CREW SWITCH COMMAND SIGNAL TO VLVS. VALVES CAN STILL BE OPENED U REDUNDANCY, WORST CASE, RESULTS IN FAILED CLOSED RESULTING IN LOSS OF	SING GPC. LOSS OF ALL MANIFOLD 5 FU & OX ISOL VLVS

DATE:1/19/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:689ABORT:3/3	
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3	
DEFININCH: 3/3 RTLS: 3/3	
TTETOFE = 3/3 TAL: 3/3	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
DEODETT: $3/3$ ATO: $3/3$	
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A16AR J4-48 TYPE I	
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: THE FAILURE RESULTS IN THE MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER	

THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 690	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICAL	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, LCA 2 PART NUMBER: 83V76A18AR J4-53 TYPE	II
CAUSES: CONTAMINATION, VIBRATION, 1	PIECE PART FAILURE, OVERLOAD
EEECONG (DIGTONITE)	

EFFECTS/RATIONALE:

DUAL EFFECT: FIRST, FALSE INDICATION OF MANIFOLD 5 FU & OX ISOL VLV MISMATCH (GPC HAS CORRECT POSITIONS); VALVE TALKBACK NOT MISSION CRITICAL. SECOND, LOSE CONTROL FEEDBACK TO REMOVE POWER FROM VLV ONCE IT HAS LATCHED: VALVE CAN WITHSTAND CONTINUOUS ENERGIZATION.

REFERENCES: VS70-943099 REV B EO B12; MC284-0420 REV C AMENDMENT SEQ. 8

DATE:1/19/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:691ABORT:3/3	
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASE HDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A	
REDUNDANCY SCREENS: A [] B [] C []	
LOCATION: F BAY 3A, LCA 2 PART NUMBER: 83V76A18AR J4-53 TYPE II	
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: FAILURE RESULTS IN A FALSE CREW (BARBER POLE) INDICATION OF VLV CLOSURE AND A FALSE CONTROL FEEDBACK WHICH INHIBITS ALL GPC AND CREW SWITCH "CLOSE" COMMANDS. WORST CASE EFFECT WOULD BE THE	

CLOSURE AND A FALSE CONTROL FEEDBACK WHICH INHIBITS ALL GPC AND CREW SWITCH "CLOSE" COMMANDS. WORST CASE EFFECT WOULD BE THE MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANTS CAN BE ISOLATED FROM THRUSTER BY THE TK ISOL 3/4/5 VLVS.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 692	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] I	В[] С[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18AR J4-55 TYPE	II

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

DUAL EFFECT: FIRST, FALSE INDICATION OF MANIFOLD 5 FU & OX ISOL VLV MISMATCH (GPC HAS CORRECT POSITIONS); VALVE TALKBACK NOT MISSION CRITICAL. SECOND, LOSE CONTROL FEEDBACK TO REMOVE POWER FROM VLV ONCE IT HAS LATCHED: VALVE CAN WITHSTAND CONTINUOUS ENERGIZATION.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 693	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/2 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)</pre>	
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3 LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 2/2	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 2/2 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18AR J4-55 TYP:	E II
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: FAILURE RESULTS IN A FALSE CREW (BA OPENING AND A FALSE CONTROL FEEDBAG CREW SWITCH "OPEN" COMMANDS. WORST MANIFOLD 5 FU & OX ISOL VLVS BECOM POSITION RESULTING IN LOSS OF MISS	CK WHICH INHIBITS ALL GPC AND I CASE EFFECT WOULD BE THE ING STUCK IN THE CLOSE

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 694	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: DRIVER, HYBRID FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B [] C []
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18AR J5-K TYPE	III
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:	
LOSE ABILITY TO COMMAND MANIFOLD 5	FU & OX ISOL VLVS CLOSE USING
CREW SWITCH OR GPC. WORST CASE RES	SULTS IN MANIFOLD 5 FU & OX VLVs
BECOMING STUCK IN THE OPEN POSITION	
PROPELLANT CAN BE ISOLATED FROM THE	RUSTERS BY THE TK ISOL 3/4/5
VLVs. VERNIER THRUSTERS ARE NOT US	SED DURING ENTRY OR ABORTS.
REFERENCES: VS70-943099 REV B EO B	312

REPORT DATE 03/18/87

DATE: 1/19/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 695 ABORT: 3/3 ITEM: DRIVER, HYBRID		
FAILURE MODE: FAILS HIGH		
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) DRIVER, HYBRID 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3A		
REDUNDANCY SCREENS: A [] B [] C []		
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18AR J5-K TYPE III		
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD		
EFFECTS/RATIONALE: LOSE CAPABILITY TO INHIBIT THE MANIFOLD 5 FU & OX ISOL VLV "CLOSE" CMD. THE INHIBIT FUNCTION IS USED FOR POWER SAVINGS AND IN CASE OF A GPC OR SWITCH FAILURE. NO EFFECT ON MISSION.		

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 696	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) FUSE, 1A 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $3/1R$
ONORBIT: 3/2R	AOA: 3/1R
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: PNL 08 S30 PART NUMBER: 33V73A8F10	

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

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN OR CLOSE FU & OX MANIFOLD ISOL 1 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 1 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 697	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R	
ITEM: FUSE,1A FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) FUSE, LA 6) 7) 8) 9)		
CRITICAL	LTTTES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/1R	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 2/1R	
LIFTOFF: 3/3	TAL: 3/1R	
ONORBIT: 3/2R	AOA: 3/1R	
DEORBIT: 3/1R	ATO: 3/1R	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [2]	B[P] C[P]	
LOCATION: PNL 08 S31 PART NUMBER: 33V73A8F27		
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE ABILITY TO OPEN OR CLOSE FU & OX MANIFOLD ISOL 2 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 2 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON OPPLT		

REFERENCES: VS70-942099 REV D EO DO1

ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 698	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R
ITEM: FUSE,1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL V 5) FUSE, 1A 6) 7) 8) 9)	
CRI	FICALITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $3/1R$
ONORBIT: 3/2R	AOA: $3/1R$
DEORBIT: 3/1R	ATO: $3/1R$
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: PNL 08 S32 PART NUMBER: 33V73A8F38	
CAUSES: CONTAMINATION, VIBRAT	ION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN OR CLOSE FU & OX MANIFOLD ISOL 3 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 3 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 HIGH SUBSYSTEM: FRCS MDAC ID: 699	HEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 2/1R	
ITEM: FUSE,1A FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER SUBS	YS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) FUSE, 1A 6) 7) 8) 9)		
CRITICALITIE	S	
PRELAUNCH: 3/3 LIFTOFF: 3/3	BORT HDW/FUNC RTLS: 2/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R	
REDUNDANCY SCREENS: A [2] B [P] C[P]	
LOCATION: PNL 08 S33 PART NUMBER: 33V73A8F43		
CAUSES: CONTAMINATION, VIBRATION, PIEC	E PART FAILURE, OVERLOAD	

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN OR CLOSE FU & OX MANIFOLD ISOL 4 VALVE USING CREW SWITCH. GPC COMMANDS ARE STILL AVAILABLE FOR VALVE OPERATION. LOSS OF ALL REDUNDANCY RESULTS IN MANIFOLD ISOL 4 VALVE FAILING CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 700	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: FUSE, 1A FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) FUSE, 1A 6) 7) 8) 9)		
CRITICAL	ITIES	
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3	
LIFTOFF: 3/3	TAL: 3/3	
ONORBIT: 3/3		
DEORBIT: 3/3	ATO: 3/3	
LANDING/SAFING: 3/3		
REDUNDANCY SCREENS: A [] I	в[] С[]	
LOCATION: PNL 08 S34 PART NUMBER: 33V73A8F39		
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD		
EFFECTS/RATIONALE: LOSE ABILITY TO COMMAND MANIFOLD 5 FU & OX ISOL VLVS CLOSE USING CREW SWITCH. GPC CAN STILL OPEN OR CLOSE VLVS. WORST CASE RESULTS IN MANIFOLD 5 FU & OX VLVS BECOMING STUCK IN THE OPEN POSITION. NO MISSION EFFECT, PROPELLANT CAN BE ISOLATED FROM THRUSTERS BY THE TK ISOL 3/4/5 VLVS. VERNIER THRUSTERS ARE NOT USED DURING ENTRY OR ABORTS.		

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 701	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/3
ITEM: FUSE,1A FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) FUSE, 1A 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/2R	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: PNL 08 S34 PART NUMBER: 33V73A8F44	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE ALL BUT ONE COMMAND (A GPC OPE	EN CMD) TO OPERATE MANIFOLD 5 FU

LOSE ALL BUT ONE COMMAND (A GPC OPEN CMD) TO OPERATE MANIFOLD 5 TO & OX ISOL VLVS. LOSS OF ALL REDUNDANCY, WORST CASE, RESULTS IN MANIFOLD 5 FU & OX ISOL VLVS BECOMING STUCK IN THE CLOSED POSITION. THE EFFECT IS LOSS OF MISSION DUE TO LOSS OF VRCS.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 702	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1	
ITEM: RELAY FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)		
CRITICAL	TTTES	
FLIGHT PHASE HDW/FUNC		
PRELAUNCH: 3/3		
	RTLS: 1/1 TAL: 2/1R AOA: 2/1R	
ONORBIT: 3/2R	$\lambda \cap \lambda + 2/1R$	
LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R	ATO: $2/1R$	
LANDING/SAFING: 3/3	ATO: 2/1R	
REDUNDANCY SCREENS: A [2]	B[P] C[P]	
LOCATION: F BAY 1, MCA 1		
PART NUMBER: 81V76A111K1		
CAUSES: CONTAMINATION, VIBRATION, P	PIECE PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 1 VALVES. THE FAILURE CAN RESULT IN THE ISOL VALVES BECOMING STUCK IN THE CLOSE POSITION THE EFFECT WOULD BE AN INADLITY TO CONDUCT TIME		

POSITION. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR INABILITY TO COMPLETE FULL MISSION REQUIREMENTS ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:703ABORT:3/3			
ITEM: RELAY FAILURE MODE: FAILS HIGH			
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL			
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3			
REDUNDANCY SCREENS: A [] B [] C []			
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K1			
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD			
EFFECTS/RATIONALE: THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 1 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN LOSS OF ALL PEDUNDANCY RESULTS IN AN INABILITY TO			

NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 2 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.

DATE: 1/26/87 HI SUBSYSTEM: FRCS MDAC ID: 704	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3	
ITEM: RELAY FAILURE MODE: FAILS OPEN		
LEAD ANALYST: V.J. BURKEMPER SUB	SYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)		
CRITICALITI	FS	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3	
LANDING/SAFING: 3/3	ATO: 3/3	
REDUNDANCY SCREENS: A [] B [] c []	
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111K2		
CAUSES: CONTAMINATION, VIBRATION, PIEC	E PART FAILURE, OVERLOAD	
EFFECTS/RATIONALE: THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 1 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 2 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.		

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 705	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76All1K2	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

FIRST FAILURE CAUSES FU & OX MANIFOLD ISOL 1 VALVES TO BE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

REFERENCES: VS70-942099 REV D EO DO1

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REPORT DATE 03/18/87

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DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 706	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)	
CRITICAL	TUTES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3	RTLS: 1/1
LIFTOFF: 3/3	TAL: $2/1R$
ONORBIT: 3/2R	AOA: 2/1R
ONORBIT: 3/2R DEORBIT: 2/1R	ATO: 2/1R
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112K1	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 2 VALVES. THE FAILURE CAN RESULT IN THE ISOL VALVES BECOMING STUCK IN THE CLOSE POSITION. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME	

REFERENCES: VS70-942099 REV D EO DO1

CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR INABILITY TO COMPLETE FULL MISSION REQUIREMENTS ON ORBIT.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:707ABORT:3/3					
ITEM: RELAY FAILURE MODE: FAILS HIGH					
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL					
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)					
CRITICALITIES					
CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3					
PRELAUNCH: 3/3 RTLS: 3/3					
LIFTOFF: 3/3 TAL: 3/3					
ONORBIT: 3/3 AOA: 3/3					
DEORBIT: 3/3 ATO: 3/3					
LANDING/SAFING: 3/3					
REDUNDANCY SCREENS: A [] B [] C []					
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112K1					
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD					
EFFECTS/RATIONALE: THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 2 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO					

STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 2 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.

DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 708	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RELAY FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)	
CRITICALIT	IES
	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: F BAY 2. MCA 2	

LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112K2

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 2 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 2 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 709	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:2/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [2]	B [P] C [P]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112K2	

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

FIRST FAILURE CAUSES FU & OX MANIFOLD ISOL 2 VALVES TO BE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE:	1/26/87	HIGHEST	CRITICALITY	HDW/FUNC
SUBSYSTEM:	FRCS		FLIGHT:	2/1R
MDAC ID:	710		ABORT:	1/1

ITEM: RELAY FAILURE MODE: FAILS OPEN

LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL

BREAKDOWN HIERARCHY:

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

	CRITICA		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	1/1
LIFTOFF:	3/3	TAL:	2/1R
ONORBIT:	3/2R	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	3/3		
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REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K7

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 3 VALVES. THE FAILURE CAN RESULT IN THE ISOL VALVES BECOMING STUCK IN THE CLOSE POSITION. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR INABILITY TO PERFORM FULL MISSION OBJECTIVES ON ORBIT.

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DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:711ABORT:3/3					
ITEM: RELAY FAILURE MODE: FAILS HIGH					
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL					
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)					
CRITICALITIES					
THE TOUR DUACE HOW/FUNC ABORT HOW/FUNC					
PRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3					
LIFTOFF: 3/3 TAL: 3/3					
ONORBIT: 3/3 AOA: 3/3					
DEORBIT: 3/3 ATO: 3/3					
LANDING/SAFING: 3/3					
REDUNDANCY SCREENS: A [] B [] C []					
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K7					
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD					
EFFECTS/RATIONALE: THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 3 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN LOSS OF ALL PEDINDANCY RESULTS IN AN INABILITY TO					

NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 4 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 712	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3				
ITEM: RELAY FAILURE MODE: FAILS OPEN					
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)					
CRITICAL	ITIES				
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3				
LIFTOFF: 3/3	TAL: 3/3				
ONORBIT: 3/3 DEORBIT: 3/3	AUA: 3/3 ATO: 3/3				
LANDING/SAFING: 3/3					
REDUNDANCY SCREENS: A [] E	B[] C[]				
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K8					
CAUSES: CONTAMINATION, VIBRATION, F	PIECE PART FAILURE, OVERLOAD				
EFFECTS/RATIONALE: THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 3 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 4 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.					

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 713	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1
ITEM: RELAY FAILURE MODE: FAILS HIGH	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)	
CRITICA	LITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/2RDEORBIT:2/1RLANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 1/1 TAL: 2/1R AOA: 2/1R ATO: 2/1R
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K8	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

FIRST FAILURE CAUSES FU & OX MANIFOLD ISOL 3 VALVES TO BE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 714	IGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 1/1		
ITEM: RELAY FAILURE MODE: FAILS OPEN			
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)			
CRITICALIT	IES		
CRITICALIT FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 2/1R LANDING (SAFING: 2/2	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 1/1		
LIFTOFF: 3/3	TAL: $2/1R$		
ONORBIT: 3/2R	AOA: $2/1R$		
DEORBIT: 2/1R	ATO: 2/1R		
LANDING/SAFING: 3/3	-,		
REDUNDANCY SCREENS: A [2] B	[P] C[P]		
LOCATION: F BAY 3A, MCA 3			
PART NUMBER: 83V76A113K9			
THAT NOUDER. 034/04TINA			
CAUSES: CONTAMINATION, VIBRATION, PIE	ECE PART FAILURE, OVERLOAD		
EFFECTS/RATIONALE:			
LOSE ABILITY TO OPEN FU & OX MANIFOLD ISOL 4 VALVES. THE FAILURE			
CAN RESULT IN THE ISOL VALVES BECOMING STUCK IN THE CLOSE			
POSITION. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME			
CRITICAL PROPELLANT DUMPS DURING RTLS	(IOSS OF VENTOLE/LITE)		
OR INABILITY TO COMPLETE FULL MISSION PROUIDEMENTS ON OPPIT			

REFERENCES: VS70-942099 REV D EO DO1

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OR INABILITY TO COMPLETE FULL MISSION REQUIREMENTS ON ORBIT.

DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 715	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3				
ITEM: RELAY FAILURE MODE: FAILS HIGH					
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL				
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)					
CRITICALIT	IES				
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	ABORT HDW/FUNC				
PRELAUNCH: 3/3	RTLS: 3/3				
LIFTOFF: 3/3	TAL: 3/3				
ONORBIT: 3/3	AOA: 3/3				
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ATO: 3/3				
LANDING/SAFING: 3/3	-				
REDUNDANCY SCREENS: A [] B	[] C[]				
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K9					
CAUSES: CONTAMINATION, VIBRATION, PI	ECE PART FAILURE, OVERLOAD				
EFFECTS/RATIONALE:					

THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 4 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 1 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.

DATE: 1/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 716 ABORT: 3/3 ITEM: RELAY					
FAILURE MODE: FAILS OPEN					
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL					
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RELAY 6) 7) 8) 9)					
CRITICALITIES					
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3					
PRELAUNCH: 3/3 RTLS: 3/3					
LIFTOFF: 3/3 TAL: 3/3					
ONORBIT: 3/3 AOA: 3/3					
DEORBIT: 3/3 ATO: 3/3					
LANDING/SAFING: 3/3					
REDUNDANCY SCREENS: A [] B [] C []					
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K10					
CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD					
EFFECTS/RATIONALE: THE FAILURE RESULTS IN FU & OX MANIFOLD ISOL 4 VALVES BECOMING STUCK IN THE OPEN POSITION. NO MISSION IMPACT, VALVES ARE NORMALLY OPEN. LOSS OF ALL REDUNDANCY RESULTS IN AN INABILITY TO ISOLATE MANIFOLD 1 FROM PROPELLANT TANKS, NO EFFECT ON MISSION.					

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 717			TICALITY LIGHT: ABORT:	HDW/FUNC 2/1R 1/1
ITEM: RELAY FAILURE MODE: FAILS H	IGH			
LEAD ANALYST: V.J. BUR	KEMPER	SUBSYS LEAD	D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPON 2) CONTROLS 3) PROP STOR & DIST & 4) MANIFOLD 4, OX & F 5) RELAY 6) 7) 8) 9)	SUBSYSTEM			
	CRITICAI	ITIES		
FLIGHT PHASE			HDW/FUN	C
PRELAUNCH:	3/3	RTLS:	1/1	
LIFTOFF:	3/3	TAL:	2/1R	
ONORBIT:	3/2R	AOA:	2/1R	
DEORBIT:	2/1R	ATO:	2/1R	
LANDING/SAFING:	3/3			
REDUNDANCY SCREENS:	A [2]	В[Р]	С[Р]	
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113K10				
CAUSES: CONTAMINATION	, VIBRATION,	PIECE PART	FAILURE, O	VERLOAD

EFFECTS/RATIONALE:

FIRST FAILURE CAUSES FU & OX MANIFOLD ISOL 4 VALVES TO BE FAILED CLOSED. THE EFFECT WOULD BE AN INABILITY TO COMPLETE TIME CRITICAL PROPELLANT DUMPS DURING RTLS (LOSS OF VEHICLE/LIFE) OR AN INABILITY TO COMPLETE FULL MISSION OBJECTIVES ON ORBIT.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 718	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] с[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R8	
CAUSES: CONTAMINATION, VIBRATION I	MECHANICAL SHOCK THEOMAT

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 1 VALVES. DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION, AND SECOND, THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 719	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R8	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STIL	L AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 720	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] H	3[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R13	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE:	TALEBACE (CLOSE DOSTUTION) TO

LOSE FWD RCS MANIFOLD ISOL 1 SWITCH TALKBACK (CLOSE POSITION) TO GPC. SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

REFERENCES: VS70-942099 REV D EO DO1

	WE CHERRY CALLEY HOW/FUNC
DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 721	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	LITIES
CRITICAL FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R13	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK ST	ILL AVAILABLE TO GPC & CREW.

SUBSYSTEM: FRCS MDAC ID: 722	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALITI	IES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	AOA: 3/3
LANDING/SAFING: 3/3	ATO: 3/3
LANDING/SALING: 3/3	
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: F BAY 1, MCA 1	
PART NUMBER: 81V76A111A1R12	
CAUSES: CONTAMINATION, VIBRATION, MEC SHOCK, OVERLOAD	HANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE FWD RCS MANIFOLD ISOL 1 SWITCH TA	LKBACK (OPEN POSITION) TO

LOSE FWD RCS MANIFOLD ISOL 1 SWITCH TALKBACK (OPEN POSITION) TO GPC. SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 723 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3 CRITICALITIES LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R12 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 724	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	
REDUNDANCY SCREENS: A [] B	[] c []
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R17	

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

EFFECTS/RATIONALE:

LOSE FU MANIFOLD 1 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT, VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 725	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAI	TTTES
FLIGHT PHASE HDW/FUNC	
DEFININCY 3/3	RTLS: 3/3
TTEMORE: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
	AOA: 3/3
	ATO: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	A10. 375
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R17	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL	L AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 726	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	В[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R26	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	AECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

SHOCK, OVERLOAD

LOSE FU MANIFOLD 1 ISOL VALVE POSITION TALKBACKS (OPEN POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 727	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R26	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILI	L AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 728 ITEM: RESISTOR, 5.1K 1/4 FAILURE MODE: FAILS SHORT	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
LEAD ANALYST: V.J. BURKEMPER BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLV 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	S
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ALITIES ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
	1AL: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R27	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	, MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE OX MANIFOLD 1 ISOL VALVE POS TO GPC. CREW POSITION INDICATOR W POSITION. LOSS OF ALL REDUNDANCY IMPACT VALVE POSITION TALKBACKS A	VILL SUPPLY CORRECT VALVE IS LOSS OF ALL TALKBACKS. NO

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 729	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICALI	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] E	B[] C[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76AlllAlR27	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL	AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 730	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R25	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
FFFFCTS /DATIONALE.	

EFFECTS/RATIONALE:

LOSE OX MANIFOLD 1 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT:3/3ABORT:3/3 SUBSYSTEM: FRCS MDAC ID: 731 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3 CRITICALITIES LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, MCA 1 PART NUMBER: 81V76A111A1R25 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 732	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] E	3[] C[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76All2AlR1	

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

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 2 VALVES. DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION AND SECOND THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH. NO IMPACT ON MISSION. VALVE'S AC MOTOR CAN WITHSTAND CONTINOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 733	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)</pre>	
CRITICAI	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R1	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE:	NATIABLE TO GPC & CREW.

NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 HIC SUBSYSTEM: FRCS MDAC ID: 734	GHEST CRITICALITYHDW/FUNCFLIGHT:3/3ABORT:3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUB	SYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B [] c []
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R8	
CAUSES: CONTAMINATION, VIBRATION, MECH SHOCK, OVERLOAD	IANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE FWD RCS MANIFOLD ISOL 2 SWITCH TAI	LKBACK (CLOSE POSITION) TO

GPC. SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 735 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS CONTROLS 2) 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS
5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 FLIGHT PHASE PRELAUNCH: LIFTOFF: 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R8

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

EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 736	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] H	B[] C[]
LOCATION: F BAY 2, MCA 2	
PART NUMBER: 82V76A112A1R9	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE FWD RCS MANIFOLD ISOL 2 SWITCH GPC. SWITCH POSITION CAN BE INDIREC	

GPC. SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 737 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3 CRITICALITIES 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R9

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

EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 738	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEODBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	TAL: $3/3$
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R10	
CAUSES: CONTAMINATION, VIBRATION, N SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE FU MANIFOLD 2 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 739 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIETOPE:3/2RTLS:3/3 TAL: 3/3 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R10 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

SUBSY	: YSTEM: ID:				HIGHES	FI	ICALI LIGHT: BORT:		0W/FUNC 3/3 3/3
		RESIST E: FAILS		1/4W					
LEAD	ANALYST	C: V.J. BU	RKEMPER	\$	SUBSYS	LEAD:	D.J. 1	PAUL	
1) 2) 3) 4)	ELECTRI CONTROI PROP ST MANIFOI	IERARCHY: CAL COMPO S OR & DIST LD 2, OX & OR, 5.1K 1	SUBSYSTE FU ISOL						
			CRI	TICAL	TIES				
I	PRELA LIFTO ONORE DEORE	PHASE LUNCH: DFF: DIT: DIT: LNG/SAFING	HDW/FUNC 3/3 3/3 3/3 3/3	2	ABOF F T P	RTLS: RTLS: NAL: NOA: NTO:	3/3	3 3 3	
REDUN	NDANCY S	CREENS:	A []	E	в []		c []	
		F BAY 2 82V76A1							
CATCE		MANANA TA			I TO LLA NT	01 0U			Ŧ

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

EFFECTS/RATIONALE:

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LOSE FU MANIFOLD 2 ISOL VALVE POSITION TALKBACKS (OPEN POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 741	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R24	

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

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE:1/26/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:742ABORT:3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R25
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: LOSE OX MANIFOLD 2 ISOL VALVE POSITION TALKBACKS (OPEN POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE

TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 743	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3 AOA: 3/3
DEODBIE: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	A10. 375
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R25	
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL	L AVAILABLE TO GPC & CREW.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87 C-645

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 744	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B	C [] C []
LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R11	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

LOSE OX MANIFOLD 2 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: 3/3 FLIGHT: SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 745 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM4) MANIFOLD 2, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: TAL: 3/3 3/3 PRELAUNCH: 3/3 LIFTOFF: 3/3 AOA: 3/3 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C []

LOCATION: F BAY 2, MCA 2 PART NUMBER: 82V76A112A1R11

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

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 746	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3, PART NUMBER: 83V76A113A1R1	

PART NUMBER: 83V76A113A1R1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 3 VALVES. DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION, AND SECOND, THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/26/87 FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 747 RESISTOR, 1.2K 2W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 3, OX & FU ISOL VLVS
5) RESISTOR, 1.2K 2W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 3/3 PRELAUNCH: LIFTOFF: 3/3 TAL: 3/3 3/3 3/3 AOA: ONORBIT: DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3, PART NUMBER: 83V76A113A1R1

CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/26/87 FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 MDAC ID: 748 ABORT: RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R16 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE FWD RCS MANIFOLD ISOL 3 SWITCH TALKBACK (CLOSE POSITION) TO GPC. SWITCH POSITION CAN BE IN DIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 FLIGHT: 3/3 ABORT: 3/3 DATE: SUBSYSTEM: FRCS MDAC ID: 749 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) . 9) CRITICALITIES CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3 3/3 3/3 LIFTOFF: 3/3 AOA: ONORBIT: DEORBIT: ATO: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R16 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 I SUBSYSTEM: FRCS MDAC ID: 750	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALIT	TFC
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R19	
CAUSES: CONTAMINATION, VIBRATION, PIP	ECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE FWD RCS MANIFOLD ISOL 3 SWITCH TALKBACK (OPEN POSITION) TO GPC. SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 751 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 RTLS: 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: AOA: 3/3 ONORBIT: 3/3 ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [,] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R19 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 752	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] E	з[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R22	
CAUSES: CONTAMINATION, VIBRATION, F	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE FU MANIFOLD 3 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT:3/3ABORT:3/3 SUBSYSTEM: FRCS 753 MDAC ID: ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 3/3 RTLS: PRELAUNCH: TAL: 3/3 LIFTOFF: 3/3 AOA: 3/3 3/3 ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R22 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

REFERENCES: VS70-942099 REV D EO DO1

REPORT DATE 03/18/87

DATE: 1/26/87 1 SUBSYSTEM: FRCS MDAC ID: 754	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER ST	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3 AOA: 3/3 ATO: 3/3
DEORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] c []
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R23	
CAUSES: CONTAMINATION, VIBRATION, PI	ECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE FU MANIFOLD 3 ISOL VALVE POSITION TALKBACKS (OPEN POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 755 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R23 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 HI SUBSYSTEM: FRCS MDAC ID: 756	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SUB	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3 ONORBIT: 3/3	TAL: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3 ATO: 3/3
LANDING/SAFING: 3/3	A10. 3/3
REDUNDANCY SCREENS: A [] B [] c[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R31	
CAUSES: CONTAMINATION, VIBRATION, PIE	CE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE OX MANIFOLD 3 ISOL VALVE POSITION TALKBACKS (OPEN POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 757	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	1
	LITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3 TAL: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R31	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE:	

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 HI SUBSYSTEM: FRCS MDAC ID: 758	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	BSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALITI	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B [] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R30	
CAUSES: CONTAMINATION, VIBRATION, PIE	CE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE OX MANIFOLD 3 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 759	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LINDING (CARTING: 2/2	ABORT HIW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R30	
CAUSES: CONTAMINATION, VIBRATION,	PIECE PART FAILURE, OVERLOAD
EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL	AVAILABLE TO GPC & CREW.

DATE: HIGHEST CRITICALITY HDW/FUNC 1/26/87 SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 760 ABORT: 3/3 ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 3/3 AOA: 3/3 FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: ATO: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R4 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE:

LOSE CONTROL FEEDBACK FROM THE FU & OX MANIFOLD ISOL 4 VALVES. DUAL EFFECT: FIRST THE RELAY WILL NOT AUTOMATICALLY BE DE-ENERGIZED ONCE THE VALVES REACH THEIR COMMANDED POSITION, AND

SECOND, THE CREW INDICATOR WILL FALSELY INDICATE A VALVE MISMATCH. NO IMPACT ON MISSION, VALVE'S AC MOTOR CAN WITHSTAND CONTINOUS POWER AND VALVE TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 761 ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 PRELAUNCH: 3/3 TAL: LIFTOFF: 3/3 3/3 AOA: ONORBIT: 3/3 ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R4 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 762	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	TAL: 3/3 AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] E	3[] C[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R17	
CAUSES: CONTAMINATION, VIBRATION, F	PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE FWD RCS MANIFOLD ISOL 4 SWITCH TALKBACK (CLOSE POSITION) TO GPC. SWITCH POSITION CAN BE IN DIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 763 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGUT PHASE 3/3 PRELAUNCH: 3/3 RTLS: TAL: 3/3 LIFTOFF: 3/3 AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R17 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 764	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICALI	TIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	[]] c[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R29	
CAUSES: CONTAMINATION, VIBRATION, P	IECE PART FAILURE, OVERLOAD
FFFFCEC (DAGTONATE.	

EFFECTS/RATIONALE:

LOSE FWD RCS MANIFOLD ISOL 4 SWITCH TALKBACK (OPEN POSITION) TO GPC. SWITCH POSITION CAN BE INDIRECTLY DETERMINED BY MONITORING VALVE POSITION TALKBACKS.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/26/87 FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 765 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R29 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 H SUBSYSTEM: FRCS MDAC ID: 766	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER SU	UBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICALIT	les
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/3LIFTOFF:3/3ONORBIT:3/3DEORBIT:3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] c[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R6	
CAUSES: CONTAMINATION, VIBRATION, PI	ECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE FU MANIFOLD 1 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 767 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 PRELAUNCH: 3/3 3/3 TAL: 3/3 LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R6 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 768 ABORT: 3/3 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/2 TAL: AOA: ATO: LIFTOFF: 3/3 3/3 ONORBIT: 3/3 3/3 DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R24 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE FU MANIFOLD 1 ISOL VALVE POSITION TALKBACKS (OPEN POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: 3/3 FLIGHT: SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 769 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 3/3 PRELAUNCH: TAL: 3/3 3/3 LIFTOFF: 3/3 3/3 AOA: ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R24 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 SUBSYSTEM: FRCS MDAC ID: 770	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	в[] С[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R32	
CAUSES: CONTAMINATION, VIBRATION, N SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE:	

LOSE OX MANIFOLD 1 ISOL VALVE POSITION TALKBACKS (OPEN POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/26/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 MDAC ID: 771 ABORT: ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS
5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 3/3 PRELAUNCH: 3/3 3/3 TAL: LIFTOFF: 3/3 AOA: ONORBIT: 3/3 ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R32 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

DATE: 1/26/87 I SUBSYSTEM: FRCS MDAC ID: 772	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	les
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] c[]
LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R7	
CAUSES: CONTAMINATION, VIBRATION, PI	ECE PART FAILURE, OVERLOAD

EFFECTS/RATIONALE:

LOSE OX MANIFOLD 4 ISOL VALVE POSITION TALKBACKS (CLOSE POSITION) TO GPC. CREW POSITION INDICATOR WILL SUPPLY CORRECT VALVE POSITION. LOSS OF ALL REDUNDANCY IS LOSS OF ALL TALKBACKS. NO IMPACT VALVE POSITION TALKBACKS ARE NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/26/87 FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 773 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 4, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/3 PRELAUNCH: 3/3 TAL: 3/3 LIFTOFF: 3/3 3/3 AOA: 3/3 ONORBIT: ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3 PART NUMBER: 83V76A113A1R7 CAUSES: CONTAMINATION, VIBRATION, PIECE PART FAILURE, OVERLOAD EFFECTS/RATIONALE: NONE, VALVE POSITION TALKBACK STILL AVAILABLE TO GPC & CREW.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/19/87 FLIGHT:3/3ABORT:3/3 SUBSYSTEM: FRCS MDAC ID: 774 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3 DEORBIT: 3/3 ATO: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-94 TO J2-87 (A) CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: LOSE FRCS MANIFOLD 5 ISOL SWITCH POSITION TALKBACK TO GPC. NO

IMPACT SWITCH TALKBACK NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 775 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 TAL: 3/3 PRELAUNCH: 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: 3/3 ATO: DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-94 TO J2-87 (A) CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

REFERENCES: VS70-943099 REV B EO B12

REPORT DATE 03/18/87

DATE:1/19/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:776ABORT:3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 ONORBIT: 3/3 AOA: 3/3 DEORBIT: 3/3 ATO: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
PRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-94 TO J2-87 (A)
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 777	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)			
CRITICAL	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING (CARENC: 2/2	ABORT HDW/FUNC		
PRELAUNCH: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: 3/3		
ONORBIT: 3/3	AUA: $3/3$		
DEORBIT: 3/3	A10: 5/5		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-94 TO GN	1D (B)		
CAUSES: CONTAMINATION, VIBRATION, SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: LOSE FRCS MANIFOLD 5 ISOL SWITCH PO IMPACT SWITCH TALKBACK NOT MISSION			

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 778	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TTES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3 AOA: 3/3 ATO: 3/3
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [] B	6 [] C []
LOCATION: F BAY 1, LCA 1 PART NUMBER: 81V76A16R J1-82	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE FRCS MANIFOLD 5 ISOL SWITCH POS IMPACT SWITCH TALKBACK NOT MISSION C	

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 779 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 FLIGHT PHASE PRELAUNCH: LIFTOFF: 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 1, LCA 1 PART NUMBER: 81V76A16R J1-82

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

EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 780	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN			
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)			
CRITICAL	TTTES		
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC		
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3		
LIFTOFF: 3/3	TAL: 3/3		
ONORBIT: 3/3	AOA: 3/3		
DEORBIT: 3/3	ATO: 3/3		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A [] E	3[] C[]		
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-88			
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	IECHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: LOSE MANIFOLD 5 FU VLV POSITION TALK TALKBACK NOT MISSION CRITICAL.	BACK TO GPC. VALVE POSITION		

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 781 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 5, OX & FU ISOL VLVS
5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/3 RTLS: 3/3 LIFTOFF: 3/3 TAL: 3/3 2/2 CRITICALITIES 3/3 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-88 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 782	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)</pre>	1
CRITICALI	ITIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3 TAL: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] E	3[] C[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-90	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE MANIFOLD 5 FU VLV POSITION TALK TALKBACK NOT MISSION CRITICAL.	BACK TO GPC. VALVE POSITION

REFERENCES: VS70-943099 REV B EO B12

HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 783 ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS
5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 PRELAUNCH: TAL: 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-90 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE:

NONE, SWITCH TALKBACK STILL AVAILABLE.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 784	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9)	
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3 TAL: 3/3 AOA: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ATO: 3/3
REDUNDANCY SCREENS: A [] B	[] C[]
LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-91	
CAUSES: CONTAMINATION, VIBRATION, ME SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: LOSE MANIFOLD 5 OX VLV POSITION TALKE TALKBACK NOT MISSION CRITICAL.	BACK TO GPC. VALVE POSITION

REFERENCES: VS70-943099 REV B EO B12

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HIGHEST CRITICALITY HDW/FUNC 1/19/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS ABORT: 3/3 MDAC ID: 785 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS
5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: 3/3 3/3 PRELAUNCH: TAL: 3/3 3/3 LIFTOFF: 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-91 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

DATE: HIGHEST CRITICALITY HDW/FUNC 1/19/87 SUBSYSTEM: FRCS FLIGHT: 3/3 MDAC ID: 786 3/3 ABORT: ITEM: RESISTOR, 5.1K 1/4W FAILURE MODE: FAILS OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIES CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-89 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: LOSE MANIFOLD 5 OX VLV POSITION TALKBACK TO GPC. VALVE POSITION TALKBACK NOT MISSION CRITICAL.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/19/87 FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 787 RESISTOR, 5.1K 1/4W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 5, OX & FU ISOL VLVS
5) RESISTOR, 5.1K 1/4W 6) 7) 8) 9) CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3 CRITICALITIES AOA: 3/3 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, LCA 3 PART NUMBER: 83V76A18R J1-89 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE.

DATE: 1/19/87 SUBSYSTEM: FRCS MDAC ID: 788	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: RESISTOR, 1.2K 2W FAILURE MODE: FAILS OPEN	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 5, OX & FU ISOL VLVS 5) RESISTOR, 1.2K 2W 6) 7) 8) 9)	
CRITICALI	TTES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: $3/3$
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	9[] C[]
LOCATION: F BAY 3A, MCA 3, PART NUMBER: 83V76A18R J2-83, 104	
CAUSES: CONTAMINATION, VIBRATION, M SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: DUAL EFFECT: FIRST, FALSE INDICATION INDICATE MANIFOLD 5 FU & OX ISOL VLV INDICATE BOTH VLVS STUCK PARTIALLY O	MISMATCH AND GPC WILL

INDICATE BOTH VLVS STUCK PARTIALLY OPEN/PARTIALLY CLOSED; TALKBACKS ARE NOT MISSION CRITICAL. SECOND, LOSE CONTROL FEEDBACK TO REMOVE POWER FROM VALVE ONCE IT HAS LATCHED; VALVE CAN WITHSTAND CONTINUOUS POWER APPLICATION.

REFERENCES: VS70-943099 REV B EO B12; MC284-0420 REV C AMENDMENT SEQ. 8

HIGHEST CRITICALITY HDW/FUNC DATE: 1/19/87 FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 789 RESISTOR, 1.2K 2W ITEM: FAILURE MODE: FAILS SHORT LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM
4) MANIFOLD 5, OX & FU ISOL VLVS
5) RESISTOR, 1.2K 2W 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/3 RTLS: PRELAUNCH: 3/3 3/3 TAL: 3/3 LIFTOFF: AOA: 3/3 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: F BAY 3A, MCA 3, PART NUMBER: 83V76A18R J2-83, 104 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, SWITCH TALKBACK STILL AVAILABLE TO HYBRID DRIVER LOGIC CIRCUIT.

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:790ABORT:3/3
ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH FAILURE MODE: SWITCH FAILS IN THE OPEN POSITION
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
DEORBIT: 3/3 ATO: 3/3
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 S30 PART NUMBER: 33V73A8S30
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY MDM CLOSE COMMANDS. IF THE SWITCH FAILS IN THE OPEN POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY SWITCH OR MDM COMMAND. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE OPEN CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 791	HIGHES	I CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 2/1R
ITEM: MANIFOLD FAILURE MODE: SWITCH FA	1, OX & FU ISOL VL AILS IN THE CLOSED 3	V SWITCH POSITION
LEAD ANALYST: V.J. BURKE	EMPER SUBSYS	LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONEN 2) CONTROLS 3) PROP STOR & DIST SU 4) MANIFOLD 1, OX & FU 5) MANIFOLD 1, OX & FU 6) 7) 8) 9)	JBSYSTEM J ISOL VLVS	
	CRITICALITIES	
FLIGHT PHASE HI PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	DW/FUNC ABOR 3/3 R 3/3 T 3/2R A 3/2R A	T HDW/FUNC TLS: 2/1R AL: 3/2R OA: 3/2R TO: 3/2R
REDUNDANCY SCREENS:	A [2] B [P]	С [Р]

LOCATION: PNL 08 S30 PART NUMBER: 33V73A8S30

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE SWITCH FAILS IN THE CLOSED POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED BY SWITCH OR MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE SWITCH'S CLOSE CONTACTS AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 792	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 2/1R
ITEM: MANIFOLD 1, OX & FU FAILURE MODE: SWITCH FAILS IN THE	ISOL VLV SWITCH GPC POSITION
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) MANIFOLD 1, OX & FU ISOL VLV S 6) 7) 8) 9)	WITCH
CRITICAI	TOTES
FLIGHT PHASE HDW/FUNC	
PRELAUNCH: 3/3	RTLS: 2/1R
LIFTOFF: 3/3	TAL: $3/2R$
LIFTOFF: 3/3 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 08 S30 PART NUMBER: 33V73A8S30

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

EFFECTS/RATIONALE:

VALVE CAN NOT BE CONTROLLED BY SWITCH, ONLY BY MDM OPEN OR CLOSE COMMANDS. TO OPERATE THE VALVE, THE CREW MUST USE THE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WHILE THE VALVE IS IN THE CLOSED POSITION WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTH DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

HIGHEST CRITICALITY HDW/FUNC 1/13/87 DATE: 3/2R FLIGHT: SUBSYSTEM: FRCS 2/1R ABORT: MDAC ID: 793 MANIFOLD 1, OX & FU ISOL VLV SWITCH OPEN CONTACTS ITEM: 1, 2 FAILURE MODE: SWITCH OPEN CONTACTS FAIL OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS CONTROLS 2) PROP STOR & DIST SUBSYSTEM 3) 4) MANIFOLD 1, OX & FU ISOL VLVS MANIFOLD 1, OX & FU ISOL VLV SWITCH OPEN CONTACTS 1, 2 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT FLIGHT PHASE HDW/FUNC RTLS: PRELAUNCH: 3/3 2/1R TAL: 3/2R 3/3 LIFTOFF: AOA: 3/2R 3/2R ONORBIT: ATO: 3/2R DEORBIT: 3/2R LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [2] B [F] C [P] PNL 08 S30 LOCATION: PART NUMBER: 33V73A8S30 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CANNOT BE OPENED BY SWITCH COMMAND, ONLY BY MDM COMMAND, AND CAN CLOSED BY THE SWITCH OR THE MDM. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:794ABORT:3/3
ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH OPEN CONTACTS
1, 2 FAILURE MODE: SWITCH OPEN CONTACTS FAIL CLOSED
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)</pre>
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH: 3/3 RTLS: 3/3
PRELAUNCH: 3/3 RTLS: 3/3
LIFTOFF: 3/3 TAL: 3/3
ONORBIT: 3/3 AOA: 3/3
PRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3
LANDING/SAFING: 3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 S30 PART NUMBER: 33V73A8S30
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY MDM CLOSE COMMANDS. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE OPEN OR GPC POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY SWITCH OR MDM COMMAND. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE CLOSED POSITION, THE VALVE WILL REMAIN CLOSED AND CAN BE OPENED WITH THE SWITCH BUT CANNOT BE CLOSED ACAIN BY SWITCH OF MDM

WITH THE SWITCH, BUT CANNOT BE CLOSED AGAIN BY SWITCH OR MDM COMMAND. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CONTACTS, AND THEN USE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:795ABORT:3/3	2		
ITEM: MANIFOLD 1, OX & FU ISOL VLV SWITCH GPC CONTACTS 3 4 FAILURE MODE: SWITCH GPC CONTACTS FAIL OPEN	3,		
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL			
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH GPC CONTACTS 3, 4 6) 7) 8) 9)</pre>			
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3			
REDUNDANCY SCREENS: A [] B [] C []			
LOCATION: PNL 08 S30 PART NUMBER: 33V73A8S30			
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD			
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.			
REFERENCES: VS70-943099 REV B EO B12, CE, DE			

DATE: 1/13/8 SUBSYSTEM: FRCS MDAC ID: 796	7		ITICALITY FLIGHT: ABORT:	3/3
ITEM: MANIF	OLD 1, OX & FU	ISOL VLV SW	ITCH GPC C	CONTACTS 3,
FAILURE MODE: SWITC	H GPC CONTACTS	FAIL CLOSED		
LEAD ANALYST: V.J. B	JRKEMPER	SUBSYS LEAD	: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMP(2) CONTROLS 3) PROP STOR & DIST 4) MANIFOLD 1, OX 8 5) MANIFOLD 1, OX 8 6) 7) 8) 9)	NENTS SUBSYSTEM FU ISOL VLVS	WITCH GPC C	ONTACTS 3,	4
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING (SAFIN)	HDW/FUNC	ABORT	HDW/FUN	С
PRELAUNCH:	3/3	RTLS:	3/3	
LIFTOFF:	3/3	TAL:	3/3	
ONORBIT:	3/3	AOA:	3/3	
DEORBIT:	3/3	ATO:	3/3	
LANDING/SAFING	: 3/3			
REDUNDANCY SCREENS:	A []	в[]	с[]	
LOCATION: PNL 08 PART NUMBER: 33V73A8				
CAUSES: CONTAMINATIC SHOCK, OVERLOAD	N, VIBRATION, N	ECHANICAL S	HOCK, THEF	RMAL
EFFECTS/RATIONALE: NONE, THESE CONTACTS	ARE NOT IN A C	IRCUIT.		

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 797	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
5, 6	FU ISOL VLV SWITCH CLOSE CONTACTS		
FAILURE MODE: SWITCH CLOSE CONT	ACTS FAIL OPEN		
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL		
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 1, OX & FU ISOL VLVS 5) MANIFOLD 1, OX & FU ISOL VLV SWITCH CLOSE CONTACTS 5, 6 6) 7) 8) 9)</pre>			
CRITI	ICALITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	ABORT HDW/FUNC BTLS: 3/3		
LIFTOFF: 3/3	RTLS: 3/3 TAL: 3/3		
ONORBIT: 3/3 DEORBIT: 3/3	AOA: 3/3 ATO: 3/3		
LANDING/SAFING: 3/3			
REDUNDANCY SCREENS: A []	B[] C[]		
LOCATION: PNL 08 S30 PART NUMBER: 33V73A8S30			
CAUSES: CONTAMINATION, VIBRATIC SHOCK, OVERLOAD	N, MECHANICAL SHOCK, THERMAL		
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM CLOSE COMMANDS. IF THE CLOSE CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE OPENED BY SWITCH OR MDM COMMAND, BUT CANNOT BE CLOSED BY SWITCH COMMAND, ONLY BY MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.			

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 798	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 2/1R		
ITEM: MANIFOLD 1, OX 8 5, 6 FAILURE MODE: SWITCH CLOSE CON	& FU ISOL VLV SWITCH CLOSE CONTACTS		
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY:			
 ELECTRICAL COMPONENTS CONTROLS PROP STOR & DIST SUBSYSTEM MANIFOLD 1, OX & FU ISOL V MANIFOLD 1, OX & FU ISOL V 	LVS		
5) MANIFOLD I, OX & FU ISOL V 6) 7) 8) 9)	LV SWITCH CLOSE CONTACTS 5, 6		
COTT	ICALITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3	ABORT HDW/FIINC		
PRELAUNCH: 3/3	RTLS: 2/1R		
LIFTOFF: 3/3	TAL: $3/2R$		
ONORBIT: 3/2R	TAL: 3/2R AOA: 3/2R		
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/2R	ATO: 3/2R		
LANDING/SAFING: 3/3	······································		
REDUNDANCY SCREENS: A [2]	B[F] C[P]		
LOCATION: PNL 08 S30 PART NUMBER: 33V73A8S30			
CAUSES: CONTAMINATION, VIBRATI SHOCK, OVERLOAD	ON, MECHANICAL SHOCK, THERMAL		

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE CLOSED OR GPC POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED BY SWITCH OR MDM COMMAND. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE OPEN POSITION, THE VALVE WILL REMAIN OPEN AND CAN BE CLOSED WITH THE SWITCH, BUT CANNOT BE OPENED AGAIN BY SWITCH OR MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CLOSE CONTACTS, AND THEN USE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:799ABORT:3/3
ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH FAILURE MODE: SWITCH FAILS IN THE OPEN POSITION
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 S31

PART NUMBER: 33V73A8S31

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY MDM CLOSE COMMANDS. IF THE SWITCH FAILS IN THE OPEN POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY SWITCH OR MDM COMMAND. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE OPEN CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

	FUNC 2R 1R
ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH FAILURE MODE: SWITCH FAILS IN THE CLOSED POSITION	
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:2/1RLIFTOFF:3/3TAL:3/2RONORBIT:3/2RAOA:3/2RDEORBIT:3/2RATO:3/2RLANDING/SAFING:3/33/3	
REDUNDANCY SCREENS: A [2] B [P] C [P]	
LOCATION: PNL 08 S31 PART NUMBER: 33V73A8S31 CAUSES: CONTAMINATION, VIBRATION MECHANICAL SHOCK THERMAL	

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE SWITCH FAILS IN THE CLOSED POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED BY SWITCH OR MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE SWITCH'S CLOSE CONTACTS AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

HIGHEST CRITICALITY HDW/FUNC 1/13/87 DATE: FLIGHT: 3/2R SUBSYSTEM: FRCS ABORT: 2/1R MDAC ID: 801 MANIFOLD 2, OX & FU ISOL VLV SWITCH ITEM: FAILURE MODE: SWITCH FAILS IN THE GPC POSITION LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE
 3/3
 RTLS:

 3/3
 TAL:

 3/2R
 AOA:
 2/1R PRELAUNCH: TAL: 3/2R LIFTOFF: 3/2R ONORBIT: ATO: 3/2R3/2R DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [2] B [P] C [P] LOCATION: PNL 08 S31

PART NUMBER: 33V73A8S31

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

EFFECTS/RATIONALE:

VALVE CAN NOT BE CONTROLLED BY SWITCH, ONLY BY MDM OPEN OR CLOSE COMMANDS. TO OPERATE THE VALVE, THE CREW MUST USE THE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WHILE THE VALVE IS IN THE CLOSED POSITION WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTH DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: FRCS FLIGHT: 3/2R MDAC ID: 802 ABORT: 2/1R MANIFOLD 2, OX & FU ISOL VLV SWITCH OPEN CONTACTS ITEM: 1, 2 FAILURE MODE: SWITCH OPEN CONTACTS FAIL OPEN LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH OPEN CONTACTS 1. 2 6) 7) 8) 9) CRITICALITIES 2

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

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

LOCATION: PNL 08 S31 PART NUMBER: 33V73A8S31

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CANNOT BE OPENED BY SWITCH COMMAND, ONLY BY MDM COMMAND, AND CAN CLOSED BY THE SWITCH OR THE MDM. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

c - 9

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 803	HIGHEST C	RITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
) 2, OX & FU ISOL VLV S	WITCH OPEN CONTACTS
1, 2 FAILURE MODE: SWITCH O	PEN CONTACTS FAIL CLOS	ED
LEAD ANALYST: V.J. BURK	EMPER SUBSYS LEA	D: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONE 2) CONTROLS 3) PROP STOR & DIST SU 4) MANIFOLD 2, OX & FU 5) MANIFOLD 2, OX & FU 6) 7) 8) 9)	UBSYSTEM	CONTACTS 1, 2
	CRITICALITIES	
FLIGHT PHASE H PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING:	3/3 ATO:	3/3
REDUNDANCY SCREENS: A	[] B[]	c []
LOCATION: PNL 08 S3 PART NUMBER: 33V73A8S3		
CAUSES: CONTAMINATION, SHOCK, OVERLOAD	VIBRATION, MECHANICAL	, SHOCK, THERMAL
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY FAIL CLOSED WHILE THE S VALVE WILL OPEN AND CAN THE OPEN CONTACTS FAIL CLOSED POSITION, THE VA WITH THE SWITCH, BUT CA COMMAND. TO CLOSE THE POWER FROM THE CONTACTS FAILURE OF ALL REDUNDAN VALVE.	WITCH IS IN THE OPEN C INOT BE CLOSED BY SWITC CLOSED WHILE THE SWITC ALVE WILL REMAIN CLOSEI ANNOT BE CLOSED AGAIN B VALVE, THE CREW MUST R S. AND THEN USE GPC REA	OR GPC POSITION, THE H OR MDM COMMAND. IF CH IS IN THE O AND CAN BE OPENED BY SWITCH OR MDM DEMOVE CONTROL BUS AD/WRITE PROCEDURES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 804	7	HIGHEST C	RITICALITY FLIGHT: ABORT:	
ITEM: MANIF 4 FAILURE MODE: SWITCH			WITCH GPC C	CONTACTS 3,
LEAD ANALYST: V.J. BU	JRKEMPER	SUBSYS LEA	D: D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPO 2) CONTROLS 3) PROP STOR & DIST 4) MANIFOLD 2, OX & 5) MANIFOLD 2, OX & 6) 7) 8) 9)	NENTS SUBSYSTEM	SWITCH GPC (CONTACTS 3,	4
	CRITICA	LITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SAFING	HDW/FUNC 3/3 3/3 3/3 3/3	ABORT RTLS: TAL: AOA: ATO:	HDW/FUN(3/3 3/3 3/3 3/3 3/3	2
REDUNDANCY SCREENS:	A []	B[]	с[]	
LOCATION: PNL 08 PART NUMBER: 33V73A8	S31 S31			
CAUSES: CONTAMINATIO SHOCK, OVERLOAD	N, VIBRATION,	MECHANICAL	SHOCK, THEF	RMAL
EFFECTS/RATIONALE: NONE, THESE CONTACTS	ARE NOT IN A	CIRCUIT.		

HIGHEST CRITICALITY HDW/FUNC 1/13/87 DATE: FLIGHT: 3/3 SUBSYSTEM: FRCS 3/3 ABORT: MDAC ID: 805 MANIFOLD 2, OX & FU ISOL VLV SWITCH GPC CONTACTS 3, ITEM: 4 FAILURE MODE: SWITCH GPC CONTACTS FAIL CLOSED LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH GPC CONTACTS 3, 4 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: 3/3 3/3 TAL: 3/3 FLIGHT PHASE PRELAUNCH: LIFTOFF: AOA: 3/3 3/3 ONORBIT: 3/3 ATO: 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [] B [] C [] LOCATION: PNL 08 S31 PART NUMBER: 33V73A8S31 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN A CIRCUIT.

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:806ABORT:3/3
ITEM: MANIFOLD 2, OX & FU ISOL VLV SWITCH CLOSE CONTACTS 5, 6 FAILURE MODE: SWITCH CLOSE CONTACTS FAIL OPEN
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH CLOSE CONTACTS 5, 6 6) 7) 8) 9)</pre>
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC
PRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 S31 PART NUMBER: 33V73A8S31

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

EFFECTS/RATIONALE:

The second secon

REDUNDANCY PROVIDED BY THE MDM CLOSE COMMANDS. IF THE CLOSE CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CAN BE OPENED BY SWITCH OR MDM COMMAND, BUT CANNOT BE CLOSED BY SWITCH COMMAND, ONLY BY MDM COMMAND. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

HIGHEST CRITICALITY HDW/FUNC DATE: 1/13/87 FLIGHT: 3/2RSUBSYSTEM: FRCS ABORT: 2/1R MDAC ID: 807 MANIFOLD 2, OX & FU ISOL VLV SWITCH CLOSE CONTACTS ITEM: 5, 6 FAILURE MODE: SWITCH CLOSE CONTACTS FAIL CLOSED LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 2, OX & FU ISOL VLVS 5) MANIFOLD 2, OX & FU ISOL VLV SWITCH CLOSE CONTACTS 5, 6 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC RTLS: TAL: AOA: 3/3 2/1R PRELAUNCH: LIFTOFF: 3/3 3/2R 3/2R ONORBIT: 3/2R ATO: DEORBIT: 3/2R 3/2R LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [2] B [F] C [P] LOCATION: PNL 08 S31 PART NUMBER: 33V73A8S31 CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE CLOSED OR GPC POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED BY SWITCH OR IF THE CLOSE CONTACTS FAIL CLOSED WHILE THE SWITCH MDM COMMAND. IS IN THE OPEN POSITION, THE VALVE WILL REMAIN OPEN AND CAN BE CLOSED WITH THE SWITCH, BUT CANNOT BE OPENED AGAIN BY SWITCH OR MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CLOSE CONTACTS, AND THEN USE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 808	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: MANIFOLD 3, OX & FU IS FAILURE MODE: SWITCH FAILS IN THE O	SOL VLV SWITCH PEN POSITION
LEAD ANALYST: V.J. BURKEMPER S	UBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) MANIFOLD 3, OX & FU ISOL VLV SWI 6) 7) 8) 9)	ТСН
CRITICALI	TIES
FLIGHT PHASE HOW/FUNC	ABORT HDW/FUNC
PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3 AOA: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [] B	[] c[]
LOCATION: PNL 08 S32 PART NUMBER: 33V73A8S32	
CAUSES: CONTAMINATION, VIBRATION, MI SHOCK, OVERLOAD	ECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: REDUNDANCY PROVIDED BY MDM CLOSE COM	MANDS. IF THE SWITCH FAILS IN

REDUNDANCY PROVIDED BY MDM CLOSE COMMANDS. IF THE SWITCH FAILS IN THE OPEN POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY SWITCH OR MDM COMMAND. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE OPEN CONTACTS, AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 809		HIGHEST CR	ITICALITY FLIGHT: ABORT:	HDW/FUNC 3/2R 2/1R
ITEM: MANIFO FAILURE MODE: SWITCH	LD 3, OX & FU 3 FAILS IN THE (ISOL VLV SW CLOSED POSI	ITCH TION	
LEAD ANALYST: V.J. BU	RKEMPER	SUBSYS LEAD	D.J. PAU	L
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPO 2) CONTROLS 3) PROP STOR & DIST 4) MANIFOLD 3, OX & 5) MANIFOLD 3, OX & 6) 7) 8) 9)	SUBSYSTEM FU ISOL VLVS	ИТСН		
	CRITICAL	ITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF:	HDW/FUNC	ABORT	HDW/FUN	С
PRELAUNCH:	3/3	RTLS:	2/1R	
LIFTOFF:	3/3	TAL:	3/2R	
ONORBIT:	3/2R	AOA:	3/2R	
DEORBIT:		ATO:	3/2R	
LANDING/SAFING	: 3/3			
REDUNDANCY SCREENS:	A [2]	В[Р]	C[P]	
LOCATION: PNL 08 S PART NUMBER: 33V73A8	S32 S32			
CAUSES: CONTAMINATIO	N, VIBRATION, N	ECHANICAL	SHOCK, THE	RMAL

SHOCK, OVERLOAD

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE SWITCH FAILS IN THE CLOSED POSITION, THE VALVE WILL CLOSE AND CANNOT BE OPENED BY SWITCH OR MDM COMMAND. TO OPEN THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE SWITCH'S CLOSE CONTACTS AND THEN USE THE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 810	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 2/1R
ITEM: MANIFOLD 3, OX & FU FAILURE MODE: SWITCH FAILS IN THE	
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) MANIFOLD 3, OX & FU ISOL VLV SV 6) 7) 8) 9)	
CRITICAL	ITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/2R DEORBIT: 3/2R LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: PNL O8 S32 PART NUMBER: 33V73A8S32	
CAUSES: CONTAMINATION, VIBRATION, N SHOCK, OVERLOAD	MECHANICAL SHOCK, THERMAL

EFFECTS/RATIONALE:

VALVE CAN NOT BE CONTROLLED BY SWITCH, ONLY BY MDM OPEN OR CLOSE COMMANDS. TO OPERATE THE VALVE, THE CREW MUST USE THE GPC READ/WRITE PROCEDURES. FAILURE OF THE MDM COMMAND PATH WHILE THE VALVE IS IN THE CLOSED POSITION WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTH DURING ABORTS AND ENTRY, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE:1/13/87HIGHEST CRITICALITYHDW/FSUBSYSTEM:FRCSFLIGHT:3/2MDAC ID:811ABORT:2/1	R
ITEM: MANIFOLD 3, OX & FU ISOL VLV SWITCH OPEN CONTAC 1, 2 FAILURE MODE: SWITCH OPEN CONTACTS FAIL OPEN	TS
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL	
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) MANIFOLD 3, OX & FU ISOL VLV SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)</pre>	
CRITICALITIES	
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:2/1RLIFTOFF:3/3TAL:3/2RONORBIT:3/2RAOA:3/2RDEORBIT:3/2RATO:3/2RLANDING/SAFING:3/33/3	
REDUNDANCY SCREENS: A [2] B [F] C [P]	
LOCATION: PNL 08 S32 PART NUMBER: 33V73A8S32	

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

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY THE MDM OPEN COMMANDS. IF THE OPEN CONTACTS FAIL OPEN WHILE THE SWITCH IS IN ANY POSITION, THE VALVE WILL REMAIN IN THAT POSITION, CANNOT BE OPENED BY SWITCH COMMAND, ONLY BY MDM COMMAND, AND CAN CLOSED BY THE SWITCH OR THE MDM. FAILURE OF THE MDM COMMAND PATH WILL AFFECT ONORBIT OPERATIONS, PROPELLANT DUMP LENGTHS DURING ABORTS, AND MAY CAUSE THE INABILITY TO EXPEL ENOUGH PROPELLANTS DURING RTLS ABORTS TO MEET THE CG SAFETY BOUNDARIES.

DATE:1/13/87HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:FRCSFLIGHT:3/3MDAC ID:812ABORT:3/3
ITEM: MANIFOLD 3, OX & FU ISOL VLV SWITCH OPEN CONTACTS 1, 2 FAILURE MODE: SWITCH OPEN CONTACTS FAIL CLOSED
FAILURE MODE: SWITCH OPEN CONTACTS FAIL CLOSED
LEAD ANALYST: V.J. BURKEMPER SUBSYS LEAD: D.J. PAUL
<pre>BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VLVS 5) MANIFOLD 3, OX & FU ISOL VLV SWITCH OPEN CONTACTS 1, 2 6) 7) 8) 9)</pre>
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/3RTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/3AOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [] B [] C []
LOCATION: PNL 08 S32 PART NUMBER: 33V73A8S32
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

REDUNDANCY PROVIDED BY MDM CLOSE COMMANDS. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE OPEN OR GPC POSITION, THE VALVE WILL OPEN AND CANNOT BE CLOSED BY SWITCH OR MDM COMMAND. IF THE OPEN CONTACTS FAIL CLOSED WHILE THE SWITCH IS IN THE CLOSED POSITION, THE VALVE WILL REMAIN CLOSED AND CAN BE OPENED WITH THE SWITCH, BUT CANNOT BE CLOSED AGAIN BY SWITCH OR MDM COMMAND. TO CLOSE THE VALVE, THE CREW MUST REMOVE CONTROL BUS POWER FROM THE CONTACTS, AND THEN USE GPC READ/WRITE PROCEDURES. FAILURE OF ALL REDUNDANCY WILL CAUSE THE INABILITY TO CLOSE THE VALVE.

SUBSYSTEM: FRCS MDAC ID: 813	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: MANIFOLD 3, OX & 4 FAILURE MODE: SWITCH GPC CONTAC	FU ISOL VLV SWITCH GPC CONTACTS 3, TS FAIL OPEN
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VL 5) MANIFOLD 3, OX & FU ISOL VL 6) 7) 8) 9)	VS V SWITCH GPC CONTACTS 3, 4
CRITI	CALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 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 O8 S32 PART NUMBER: 33V73A8S32	
CAUSES: CONTAMINATION, VIBRATIO SHOCK, OVERLOAD	N, MECHANICAL SHOCK, THERMAL
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN	A CIRCUIT.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

REPORT DATE 03/18/87

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DATE: 1/13/87 SUBSYSTEM: FRCS MDAC ID: 814	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: MANIFOLD 3, OX &	FU ISOL VLV SWITCH GPC CONTACTS 3,
FAILURE MODE: SWITCH GPC CONTA	CTS FAIL CLOSED
LEAD ANALYST: V.J. BURKEMPER	SUBSYS LEAD: D.J. PAUL
BREAKDOWN HIERARCHY: 1) ELECTRICAL COMPONENTS 2) CONTROLS 3) PROP STOR & DIST SUBSYSTEM 4) MANIFOLD 3, OX & FU ISOL VI 5) MANIFOLD 3, OX & FU ISOL VI 6) 7) . 8) 9)	LVS LV SWITCH GPC CONTACTS 3, 4
CRITICALITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/3 ONORBIT: 3/3 DEORBIT: 3/3	ABORT HDW/FUNC
PRELAUNCH: 3/3	RTLS: 3/3
LIFTOFF: 3/3	TAL: 3/3
ONORBIT: 3/3	AOA: 3/3
DEORBIT: 3/3	ATO: 3/3
LANDING/SAFING: 3/3	
REDUNDANCY SCREENS: A []	B[] C[]
LOCATION: PNL 08 S32 PART NUMBER: 33V73A8S32	
CAUSES: CONTAMINATION, VIBRATION, MECHANICAL SHOCK, THERMAL SHOCK, OVERLOAD	
EFFECTS/RATIONALE: NONE, THESE CONTACTS ARE NOT IN	A CIRCUIT.

REFERENCES: VS70-943099 REV B EO B12, CE, DE

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