MCDONNELL DOUGLAS ASTRONAUTICS COMPANY HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEMS ENGINEERING AND OPERATIONS SUPPORT

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INDEPENDENT ORBITER ASSESSMENT ANALYSIS OF THE DPS SUBSYSTEM

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Independent Orbiter Assessment Analysis of the DPS Subsystem

1.0 EXECUTIVE SUMMARY

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The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Mode and Effects Analysis / Critical Items List (FMEA/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 the <u>Rockwell Desk</u> <u>Instructions 100-2G</u>. The IOA approach features a top-down analysis of the hardware to independently determine failure modes, criticality, and potential critical items. This report documents the independent analysis results corresponding to the Orbiter Data Processing System (DPS) hardware.

The DPS hardware is required for performing critical functions of data acquisition, data manipulation, data display, and data transfer throughout the Orbiter. Specifically, the DPS hardware consists of the following components:

- o Multiplexer/Demultiplexer (MDM)
- o General Purpose Computer (GPC)
- o Multifunction CRT Display System (MCDS)
- o Data Buses and Data Bus Couplers (DBC)
- o Data Bus Isolation Amplifiers (DBIA)
- o Mass Memory Unit (MMU)
- o Engine Interface Unit (EIU)

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

Figure 1 presents a summary of the failure criticalities for each of the seven major subdivisions of the DPS. A summary of the number of failure modes, by criticality, is also presented below with hardware criticality first and functional criticality second.

+	Summary	of	Fai	lur	e Mo	des B	y Y	Criti	cality	(HW/1	F)
Criti	cality:		1/1	2	/1R	2/2		3/1R	3/2R	3/3	TOTAL
Numbe	er :		0		2	0		56	22	5	85

DPS OVERVIEW ANALYSIS SUMMARY

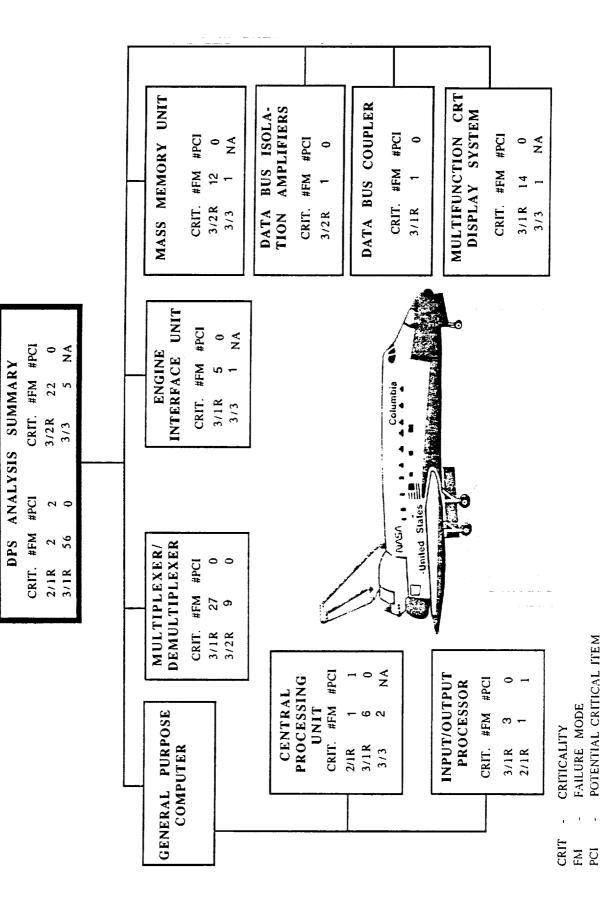


Figure 1 - DPS OVERVIEW ANALYSIS SUMMARY

For each failure mode identified, the criticality and redundancy screens were examined to identify critical items. A summary of potential critical items is presented as follows:

	Summary	of I	Potentia	al Cri	tical	Items	(HW/F)	
Critica	ality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTA
Number	:	0	2	0	0		0	2

Due to the extensive redundancy built into the DPS the number of critical items are few. Those identified resulted from premature operation and erroneous output of the GPCs.

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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 Space Transportation System (STS) Systems 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.

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2.2 Scope

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

2.3 Analysis Approach

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

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The DPS ground rules and assumptions used in the IOA are defined in Appendix B. The subsystem specific ground rules were defined to limit the analysis to single-failed-parts for each failure mode. A subset of the failure mode keywords were identified for the DPS team. This allowed for commonality in the analysis results.

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The DPS consists of that hardware required for data acquisition, data manipulation, data display, and data transfer on the Orbiter, and includes the five onboard computers and their interfaces. Reference Figure 2. More specifically, the DPS consists of the following components:

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- 1. Twelve MDM units which convert and format data at the remote locations. Each MDM has internal redundancy and consists of a Multiplexer Interface Adapter (MIA), Sequential Control Unit (SCU), Input/Output Module, Analog To Digital Converter, and Power Supply. They convert and format serial digital GPC commands into parallel discrete, digital, and analog data for transfer to vehicle subsystem hardware. They also convert and format parallel discrete, digital, and analog data from vehicle subsystems into serial digital data for transmission to the GPCs. Reference Figure 3.
- 2. Five GPCs each consisting of a Central Processing Unit (CPU) and Input/Output Processor (IOP). The CPU functionally consists of an Arithmetic Logic Unit, Local Store, Master Bus Control Unit, Data Flow Multiplexer, Micro-code control unit, CPU Timer, Interrupt Logic, Main Memory Timing Page, Timers, Address Bus Control, Main Memory, and Power Supply. The IOP contains Control Monitor, IOP Main Memory, Channel Control, Direct Memory Access Queue, Arithmetic Logic Units, Local Store, Microcode store and Decode, MIAs, and Time-slice and Multiplexing. One of the functions of the GPCs is to support guidance, navigation, and control requirements of the vehicle. They provide for the monitoring and control of vehicle subsystems. They also check for data transmission errors and crew input error. Vehicle system failures and out-of-tolerance conditions are annunciated by the GPCs. Reference Figure 4 and Figure 5.
- 3. The MCDS consisting of three Keyboard Units (KU), four Display Units (DU) and four Display Electronics Units (DEU). Each KU has a Key, Switch and Light. The DU consists of X/Y Deflection Amplifiers, Video Amplifiers, Cathode-Ray Tube, BITE and Power Supplies. The DEU has an Oscillator, Memory, Key-board Adapter, Symbol Generator, MIA, Control Logic, BITE, Load Switch, and Power Supplies. The subsystem provides for crew/vehicle interface via a keyboard and CRT display. The crew can interact with the subsystems with keyboard entries and executions. Reference Figure 6 and Figure 7.

- 4. Thirty serial digital data buses are connected to the Bus Terminal Units (BTUs) via 227 DBCs. The DBCs are shown in Figure 8.
- 5. Two DBIAs provide the amplification necessary to drive the stubs and provide isolation when the stubs are opened or shorted at the umbilicals.
- 6. Two MMUs containing MIAs, Read Electronics, Write Electronics, Mass Memory Control Logic, Power Supply with Switch, Tape Transport Mechanism with a motor, tape and heads. The mass memory unit stores programs for loading into the GPCs and the MCDS. Reference Figure 9.
- 7. Three EIUs which provide status and command capability of the main engines. The EIU contains an MIA, BITE, Status Buffer, Controller Interface Adapter, Operational Interface Element, Data Status and Power Supply. The EIU transfers main engine control commands from the GPC and main engine status for use by the GPC, the GSE launch processing system, and the operational instrumentation system. Reference Figure 10.

The DPS interfaces with many onboard Orbiter systems including the Main Propulsion System, Solid Rocket Boosters, Reaction Control System (RCS), Orbital Maneuvering System (OMS), Air Surface Controls used for guidance and control, Nose-wheel Steering, and the Master Timing Units.

3.2 Interfaces and Locations

The DPS hardware is located throughout the Orbiter. The composite data bus network provides the hardware interfaces between the GPCs and all other avionics subsystems that communicate via a digital data format. Reference Figure 11. GPCs 1 and 4 are located in Avionics Bay 1 while GPCs 2 and 5 are located in Avionics Bay 2, to provide separation of redundancy. GPC 3 is located in Avionics Bay 3. Each GPC interfaces to all Flight Critical MDMs, however only one GPC normally communicates to only one FF and one FA MDM during ascent and entry dynamic flight.

3.3 Hierarchy

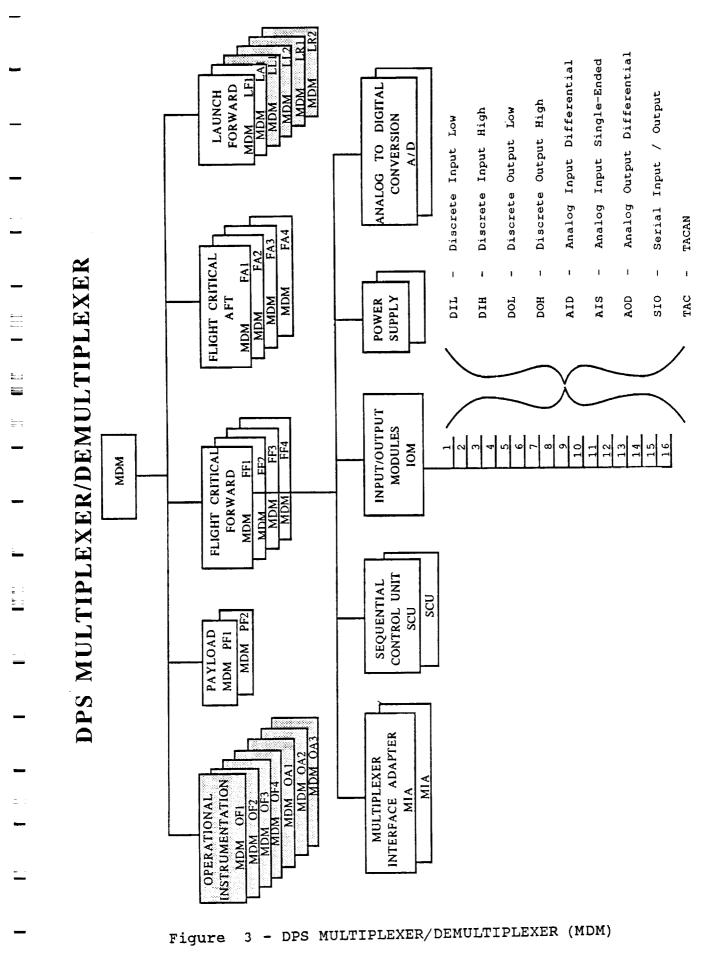
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Figure 2 illustrates the hierarchy of the DPS hardware and the corresponding subcomponents. Figures 3 through 10 comprise the detailed system representations.

MASTER TIMING MULTIFUNCTION MANIPULATOR **CRT DISPLAY** CONTROLLER INTERFACE DPS Interface but not considered SYSTEM (1 of 1) (1 of 1) in DPS Analysis MASTER DATA PROCESSING SUBSYSTEM OVERVIEW (1 of 2) UNIT (1 of 1) PCM TINU AMPLIFIERS MASS MEMORY ISOLATION 5 (1 of 2) (1 of UNIT PROCESSING SUBSYSTEM DATA BUSES DATA (1 of 30) INTERFACE ENGINE (1 of 3) UNIT DEMULTIPLEXER MULTIPLEXER/ (1 of 12) INPUT/OUTPUT PROCESSOR (1 per GPC) **GENERAL PURPOSE** COMPUTER (1 of 5) PROCESSING (1 per GPC) CENTRAL UNIT

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Figure 2 - DPS SUBSYSTEM OVERVIEW



INTERRUPT LOGIC MAIN MEMORY INPUT/OUTPUT TIMING PAGE MAIN MEMORY POWER SUPPLY ADDRESS BUS PROCESSOR CONTROL TIMERS DPS GPC - CENTRAL PROCESSING UNIT ŝ **GENERAL PURPOSE** COMPUTER ARITHMETIC LOGIC CONTROL UNIT MASTER BUS MULTIPLEXER CONTROL UNIT LOCAL STORE **MICRO-CODE** CPU TIMING DATA FLOW UNIT PROCESSING CENTRAL UNIT

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INPUT/OUTPUT PROCESSOR MULTIPLEXER INTER-MICROCODE STORE TIME SLICE AND - INPUT/OUTPUT PROCESSOR MULTIPLEXING FACE ADAPTER ARITHMETIC LOGIC UNIT LOCAL STORE AND DECODE **GENERAL PURPOSE** COMPUTER DPS GPC DIRECT MEMORY MAIN MEMORY ADDRESS LOGIC ACCESS QUEUE MONITOR CONTROL CHANNEL CONTROL **IOP MAIN** MEMORY PROCESSING CENTRAL UNIT

Figure 5 - DPS GPC INPUT/OUTPUT PROCESSOR (IOP)

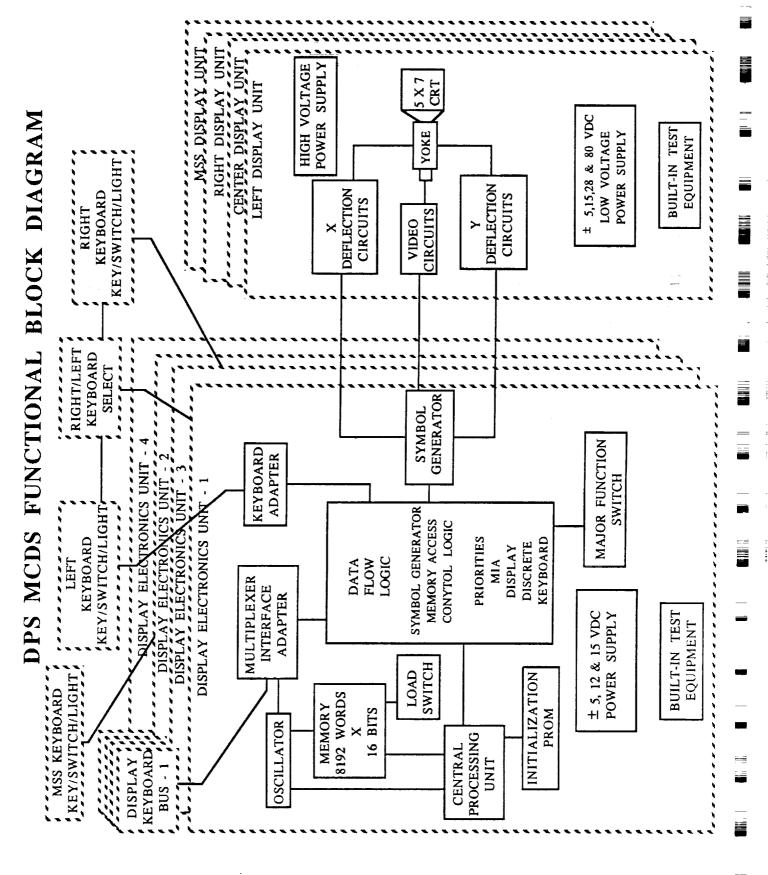


Figure 6 - DPS MCDS FUNCTIONAL BLOCK DIAGRAM

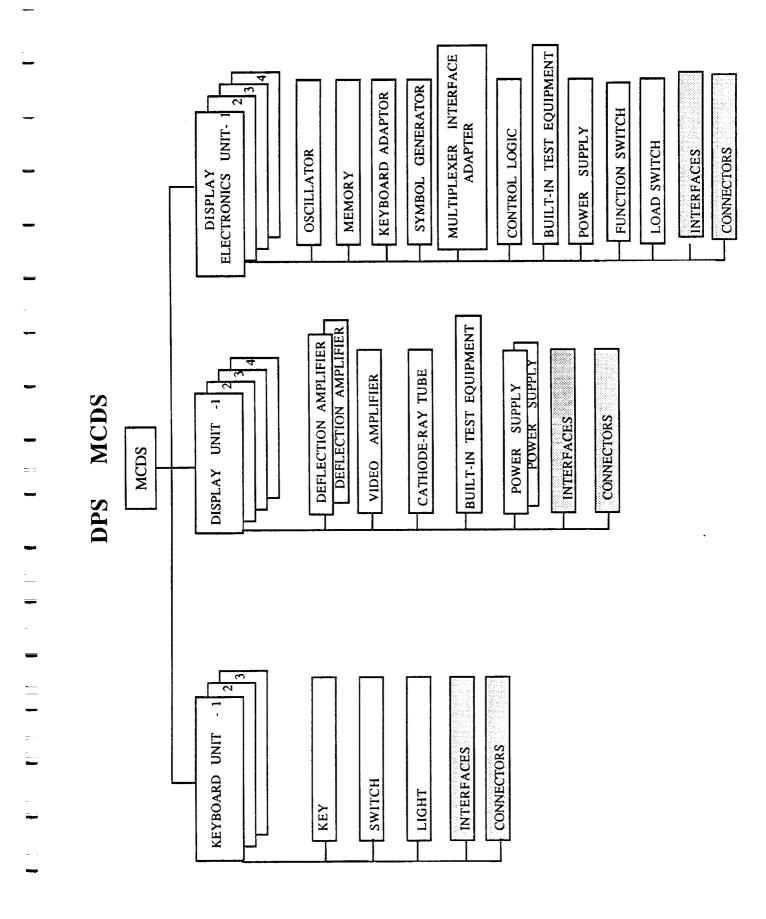


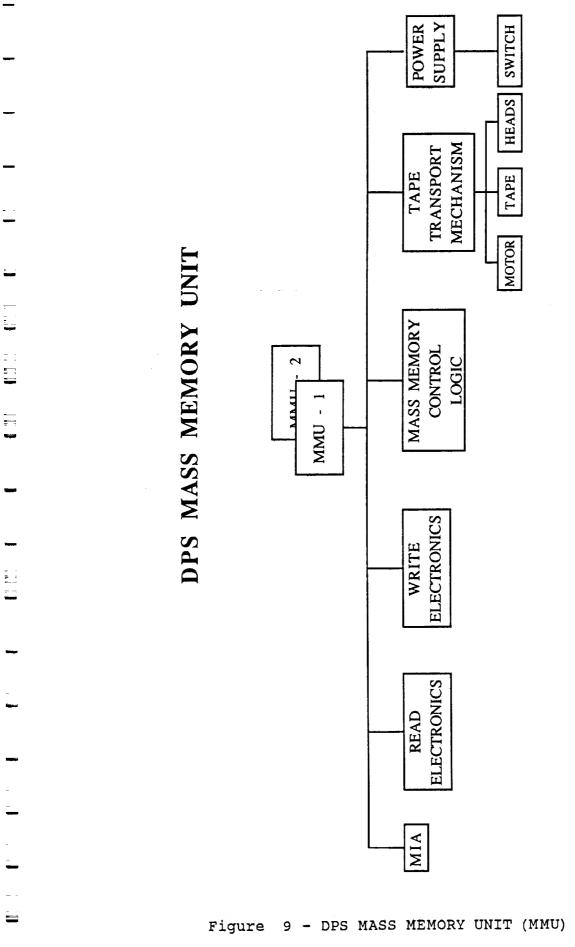
Figure 7 - DPS MCDS

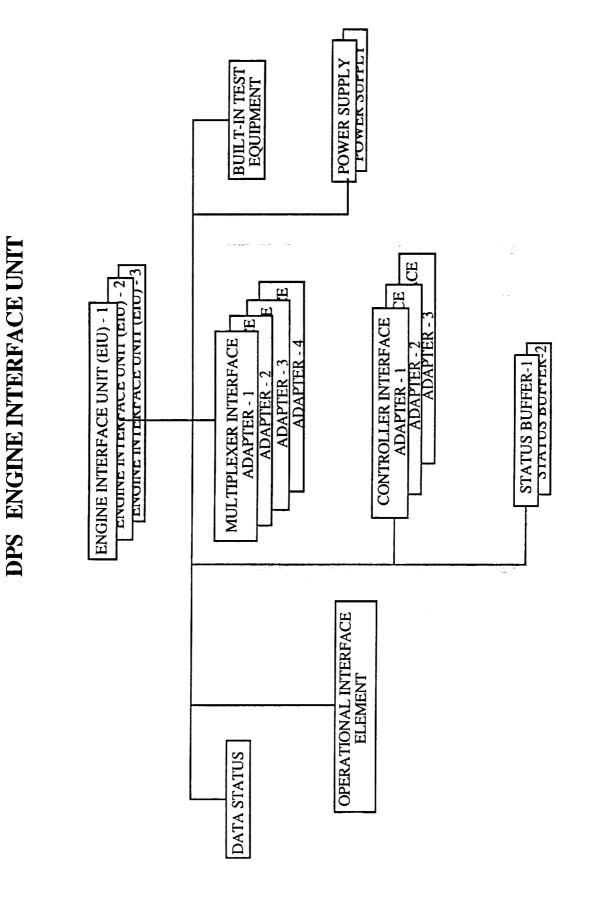
ERS		DATA BUS	INTER-COMPUTER-4 INTER-COMPUTER-5 INSTRUMENTATION/PCMMU-2 INSTRUMENTATION/PCMMU-3 INSTRUMENTATION/PCMMU-3 INSTRUMENTATION/PCMMU-4 INSTRUMENTATION/PCMMU-5 LAUNCH/BOOST-1 LAUNCH/BOOST-1 LAUNCH/BOOST-2 MASS MEMORY-1 MASS MEMORY-1 MASS MEMORY-2 PAYLOAD INTERFACE-1 PAYLOAD INTERFACE-1 PAYLOAD INTERFACE-1 PAYLOAD INTERFACE-1 PAYLOAD INTERFACE-2 PAYLOAD INTERFACE-1 PAYLOAD INTERFACE-2
DATA BUS COUPLERS		QUANTITY	ა ა ო ო ო ო ო გ გ ბ დ 4 4 დ ∞
DPS DATA		DATA BUS	DISPLAY/KEYBOARD-1 DISPLAY/KEYBOARD-2 DISPLAY/KEYBOARD-3 DISPLAY/KEYBOARD-4 FLIGHT CRITICAL-1 FLIGHT CRITICAL-1 FLIGHT CRITICAL-3 FLIGHT CRITICAL-3 FLIGHT CRITICAL-6 FLIGHT CRITICAL-6 FLIGHT CRITICAL-6 FLIGHT CRITICAL-8 INTER-COMPUTER-1 INTER-COMPUTER-1 INTER-COMPUTER-2 INTER-COMPUTER-2
	PIN No.	QUANTITY	۰ ۰ ۰ ۲ I I I I I ۷ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰

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Figure 8 - DPS DATA BUS COUPLERS (DBC)





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Figure 10 - DPS ENGINE INTERFACE UNIT (EIU)

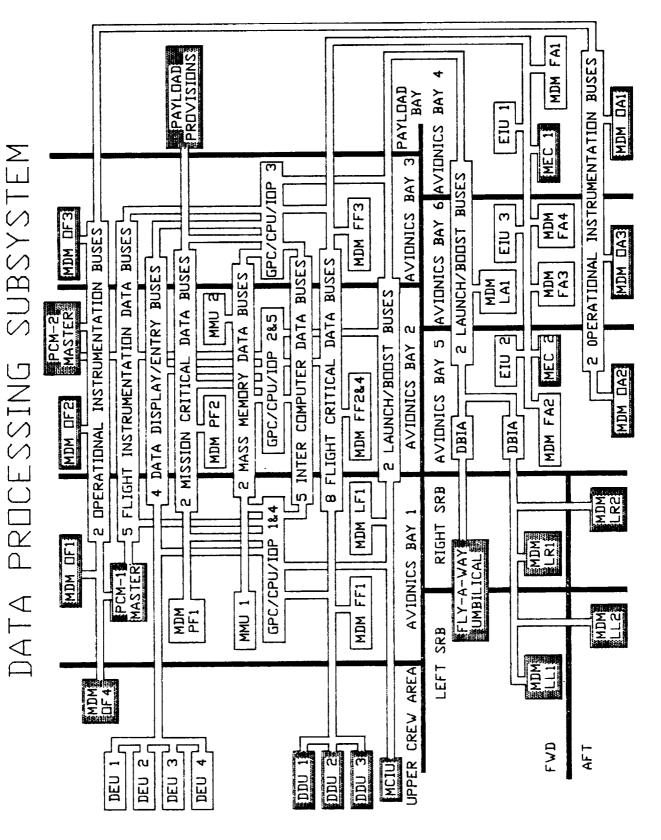


Figure 11 - DATA PROCESSING SUBSYSTEM (DPS)

4.0 ANALYSIS RESULTS

Detail analysis results for each of the identified failure modes are presented in Appendix C. Table I presents a summary of the failure criticalities for each of the seven major subdivisions of the DPS. Further discussion of each of these subdivisions and the applicable failure modes is provided in subsequent paragraphs.

TABLE I Summa	ry of I	Possible	e Fail	ure Mode	es and (Critica	alities
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
MDM	-	-	-	27	9	-	36
GPC	i –	2	-	9	-	2	13
MCDS	i - 1		-	14	-	1	15
DBC	-	-	-	1	-	-	1
DBIA	i – i	-	-	-	1	-	1
MMU	-	-	-	-	12	1	13
EIU	-	-	-	5	-	1	6
TOTAL	0	2	0	56	22	5	85

Of the 85 failure modes analyzed, no single failures were determined to result in loss of crew or vehicle, and two were determined to result in loss of mission. A summary of the potential critical items is presented in Table II. Appendix D presents a cross reference between each potential critical item (PCI) and a specific worksheet in Appendix C.

TABLE II Sun	nmary of Po	tential Criti	cal Items	
Criticality:	1/1 2	/1R 2/2 3	/1R 3/2R	3/3 TOTAL
GPC	-	2	- -	- 2

4.1 Analysis Results MDM

The MDM analysis considered nine failure modes for four groups of MDMs; namely FF, FA, PF, LF/LA as illustrated in Figure 3. Most of the criticalities were 3/1R. No PCIs were found.

4.2 Analysis Results GPC

The GPC analysis was subdivided into IOP and CPU failures. Generic black box failures were analyzed with causes stemming from failures of the subcomponents such as the MIA, as shown in Figure 4 and Figure 5. Two PCIs were identified and are listed in Appendix D.

4.3 Analysis Results MCDS

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The MCDS consists of the KU, DU, and DEU. Functional failures of components were analyzed. These components are shown functionally in Figure 6 and Figure 7. Nine failure modes were identified and fifteen worksheets were generated. No PCIs were identified.

4.4 Analysis Results DBC

Thirty serial digital data buses connect the GPC IOPs to the BTUs via 227 DBCs. The DBCs functional components are shown in Figure 8. Two failure modes were identified and one worksheet was generated. No PCIs were identified.

4.5 Analysis Results DBIA

The DBIAs consist of components required to provide isolation between the Orbiter Launch/Boost Data Buses and the SRBs and associated GSE for each. Four failure modes were identified and one worksheet was generated. No PCIs were identified.

4.6 Analysis Results MMU

The MMU analysis investigated failures in the individual components of power supply, read and write electronics, tape transport mechanism, MIA and control logic. These are shown functionally in Figure 9. The power switch and RPC were also investigated. Most of the failures were criticality 3/2R. No PCIs were identified.

4.7 Analysis Results EIU

The EIU provides commands to and status of the Main Engines. There were no failure modes analyzed that resulted in a PCI being defined. The EIU is shown functionally in Figure 10.

5.0 REFERENCES

E :

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

- 1. ICD 13M15000, Vehicle/Main Engine Interface Control Document, Rev. U, 6-18-85
- 2. JSC-18819, DPS Console Handbook, 8-1-84
- 3. JSC-19041, MPS System Briefs, 10-1-84
- 4. JSC-18820, DPS System Briefs, 4-20-85
- 5. VS70-971102, Integrated System Schematic Rev. D, 9-28-85
- 6. JSC-17239, Booster Console Handbook, 10-17-85
- 7. JSC-12770, Shuttle Flight Operations Manual, Volume 5, Data Processing System, 3-24-84
- 8. JSC 12820, STS Operational Flight Rules, Final PCN-3, 6-28-85
- 9. JSC 11174, Space Shuttle Systems Handbook, Rev. C, DCN-5, 9-13-85
- 10. 100-2G, Rockwell International Reliability Desk Instruction Flight Hardware FMEA and CIL, 1-31-84
- 11. V72 Vol III, Operations and Maintenance Requirements and Specification Document - Orbiter OMRSD - DPS, 6-13-86

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APPENDIX A ACRONYMS

- /-	austru be Dévibel
A/D	- Analog to Digital
AID	- Analog Input Differential
AIS	- Analog Input Single-ended
ALU	- Arithmetic Logic Unit
AOA	- Abort Once Around
AOD	- Analog Output Differential
ATO	- Abort To Orbit
BFC	- Backup Flight Controller
BFS	- Backup Flight System
BITE	- Built-In Test Equipment
	- Backup System Services
BTU	
	- Critical Items List
	- Central Processing Unit
	- Criticality
	- Cathode Ray Tube
C&W	
	- Data Bus Coupler
DBTA	- Data Bus Isolation Amplifier
וזממ	- Display Driver Unit
DEU	- Display Electronics Unit
DTH	- Discrete Input High
DIL	- Discrete Input Low
DMA	- Direct Memory Access
DOH	- Discrete Output High
DMA DOH DOL	- Discrete Output Low
DPS	- Data Processing System
DU	- Display Unit
EIU	- Engine Interface Unit
EVA	
FA	
	- Flight Control Operating System
FF	• • • •
	- Failure Mode
	- Failure Mode and Effects Analysis
	- General Purpose Computer
	- Ground Support Equipment
IMU	- Inertial Measurement Unit
IOA	- Independent Orbiter Assessment
IOM	- Input/Output Module
IOP	- Input/Output Processor
IPL	- Initial Program Load
KU	- Keyboard Unit
LF	- Launch Forward
LL	- Launch Left
LPS	- Launch Processing System
LR	- Launch Right
LRU	- Line Replaceable Unit
MC	- Memory Configuration
	- Multifunction CRT Display System
MCIU	
11010	wereharded courses the succession out

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MDAC MDM MEC MIA MM MMU MTU NA NASA NSTS OA	 McDonnell Douglas Astronautics Company Multiplexer/Demultiplexer Main Engine Controller Multiplexer Interface Adapter Major Mode Mass Memory Unit Master Timing Unit Not Applicable National Aeronautics and Space Administration National Space Transportation System Operational Aft 	
OF	• Operational Forward	- ·
OMRSD	- Operational Maintenance Requirements and Specification	ons
OMAD	Document	
OMS	- Orbital Maneuvering System	
OPS	- Operational Sequence	
PCI	· Potential Critical Item	
PCM	· Pulse Code Modulation	
PF	Devilord Forward	
RCS	· Reaction Control System	
RHC	· Rotational Hand Controller	
RI	- Rockwell International	
RM	- Redundancy Management	
RMS	• Remote Manipulator System	
RPC	Remote Power Controller	
RS	Redundant Set	
RTLS	· Return To Landing Site	
SCU	· Sequential Control Unit	
SIO	· Serial Input / Output	
SM	· Systems Management	
SRB	Solid Rocket Booster	
SSME	Space Shuttle Main Engine	
STS	· Space Transportation System	
SW	- Software	
TAC	· Tacan	
TAL	• Transatlantic Abort Landing	
TD	· Touch Down	
THC VDC	• Translational Hand Controller • Volts Direct Current	

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APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

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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>Reliability</u> <u>Desk</u> <u>Instruction</u>, <u>100-2G</u> Rockwell International, 31 January 1984, were used with the following amplifications and additions.

ABORT DEFINITIONS:

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

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

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

ATO - begins at declaration of the Abort To Orbit (ATO) and ends upon transition out of OPS 1.

<u>CREDIBLE (CAUSE)</u> - 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.

EFFECTS/RATIONALE - Description of the case which generated the highest criticality.

HIGHEST CRITICALITY - The highest criticalities determined in the phase-by-phase analysis.

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

<u>MC</u> - Memory Configuration of Primary Avionics Software System (PASS).

MISSION - assigned performance of a specific orbiter flight with payload/objective accomplishments such as launch window, orbit phasing, and altitude.

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

NORMAL GROUND TURNAROUND - begins at end of post-landing safing operations and ends at beginning of prelaunch operations.

OPS - software operational sequence.

PHASE DEFINTIONS:

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

LIFTOFF MISSION PHASE - begins with 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 upon 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 at landing site.

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

<u>READILY</u> <u>DETECTABLE</u> - easily and obviously observable and comprehensable by flight and/or ground personnel. Readily detectable requires the capability of getting a crewmember to respond to a problem notification via real-time monitored displays, on-board alerts, visual indications, or ground notification. (Ground notification must not be considered unless sufficient time is available to perform corrective action to preclude the critical consequences of the failure, using worstcase telemetry and data.)

APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in <u>Reliability Desk</u> <u>Instruction, 100-2G</u> Rockwell International, 31 January 1984, was employed with the following amplifications and additions.

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

2. After Lift-Off, 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 on-board personnel is beyond the scope of this task. ==

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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.

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

7. The presence of a failure detectability parameter in telemetry is sufficient justification for passing Redundancy Screen B. Verification that the parameter is actually monitored 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. For the purpose of passing Redundancy Screen A, the term "normal ground turnaround" shall include the prelaunch mission phase.

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RATIONALE: Some items cannot be checked out until after propellant loading or main engine conditioning begins although the vehicle is still on the ground. This philosophy was adopted by the Level II PRCB.

9. At a minimum, loss of mission is declared when a failure results in a launch delay beyond the pre-planned launch window.

RATIONALE: Subsystem failures can occur near the nominal launch time. When these failures result in a launch delay, a loss of mission occurs even though the vehicle never enters into any in-flight mode.

10. 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, whatever produces the worst case effects for the phase of interest.

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

11. The "Next Related Failure" when used in determining hardware criticality 2 (one failure away from loss of crew/vehicle) is defined as the worst case failure of next redundant item. This definiton applies only to dual redundancy by definition.

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RATIONALE: The RI Desk Instruction Appendix B, 3.1.1.1 states the definiton of criticality 2. For the purpose of this analysis "Next related Failure" is clearly defined to ensure project consistancy.

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APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.3 DPS-Specific Ground Rules and Assumptions

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

- 1. Electronics were considered to have the following credible failure modes.
 - a. Premature operation
 - b. Erroneous/erratic output
 - c. No output

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RATIONALE: These failure mode keywords were the most applicable for the DPS electronics hardware.

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APPENDIX C DETAILED ANALYSIS

This section contains the IOA analysis worksheets employed during the analysis of the DPS subsystem. The information on these worksheets is intentionally similar to the FMEA's written by Rockwell and the NASA. Each of these sheets identifies the item being analyzed, and parent assembly, as well as the function. For each failure mode, the possible causes are outlined, and the assessed hardware and functional criticality for each mission phase is listed, as described in the <u>Rockwell Desk Instructions</u> <u>100-2G</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
- 3 = Non loss of life or vehicle or mission

Functional Criticalities :

- IR = Redundant identical hardware components or redundant functional paths all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant identical hardware components or redundant functional paths all of which, if failed, could cause loss of mission.

Redundancy Screen A :

- 1 = Is Checked Out PreFlight
- 2 = Is Capable of Check Out PreFlight
- 3 = Not Capable of Check Out PreFlight
- 4 = Do Not Know

Redundancy Screens B and C :

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

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DATE:10/03/86HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:DPSFLIGHT:3/1RMDAC ID:100ABORT:3/1R					
ITEM: MDM FF1,FF2,FF3,FF4 FAILURE MODE: LOSS OF OUTPUT TO GPC					
LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB					
BREAKDOWN HIERARCHY: 1) DPS					
2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FLIGHT CRITICAL FORWARD MDM (FF14) 4) 5) 6)					
7) 8) 9)					
CRITICALITIES					
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:3/1RLIFTOFF:3/1RTAL:3/1RONORBIT:3/2RAOA:3/1RDEORBIT:3/1RATO:3/1RLANDING/SAFING:3/1RATO:3/1R					
REDUNDANCY SCREENS: A [1] B [P] C [P]					
LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110					
CAUSES: VIBRATION, CORROSION, CONTAMINATION					
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM, BUT NOT ALLOWED DURING ASCENT UNTIL AFTER 2ND MDM FAILURE. IF ALL REDUNDANCY FAILS, LOSE USE OF IMU TORQUING, FORWARD RCS JETS, HAND CONTROLS (THC,RHC), MOST SWITCHES AND INDICATORS.					

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REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 101	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: MDM FF1,FF2,FF3,FF FAILURE MODE: LOSS OF OUTPUT TO	4 LRU
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (1 3) FLIGHT CRITICAL FORWARD MDM 4) 5) 6) 7) 8) 9)	MDM) (FFl4)
CRITIC	ALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R	ABORT HDW/FUNC
PRELAUNCH: 3/2R	RTLS: 3/1R
LIFTOFF: 3/1R	$\frac{1}{1}$
DEODRIM: 3/2R	
LANDING/SAFING: 3/1R	R10. 5/1K
,	
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110	0
CAUSES: VIBRATION, CORROSION, CON	NTAMINATION
EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THIS PROCESSING. FAULT TOLERANCE DEPEN VOTING LRUS. DETECTION DEPENDS OF SIGNALS. IF ALL REDUNDANCY FAILS FORWARD RCS JETS, HAND CONTROLS (INDICATORS.	NDS ON REDUNDANT STRINGS TO N SEPARATE, REDUNDANT FEEDBACK , LOSE USE OF IMU TORQUING,
REFERENCES:	
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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 102	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: MDM FF1,FF2,FF3,FF4 FAILURE MODE: ERRONEOUS OUTPUT TO	GPC		
LEAD ANALYST: W. A. HAUFLER S	UBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MD 3) FLIGHT CRITICAL FORWARD MDM (F 4) 5) 6) 7) 8) 9)	M) Fl4) The set of		
CRITICAL	JITIES		
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/2RLIFTOFF:3/1RONORBIT:3/2RDEORBIT:3/1RLANDING/SAFING:3/1R	ABORTHDW/FUNCRTLS:3/1RTAL:3/1RAOA:3/1RATO:3/1R		
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110			
CAUSES: VIBRATION, CORROSION, CONT	AMINATION		
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM, BUT NOT ALLOWED DURING ASCENT UNTIL AFTER 2ND MDM FAILURE. IF ALL REDUNDANCY FAILS, LOSE USE OF IMU TORQUING, FORWARD RCS JETS, HAND CONTROLS (THC,RHC), MOST SWITCHES AND INDICATORS.			

DATE: 10/03/86 HIG SUBSYSTEM: DPS MDAC ID: 103	HEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: MDM FF1,FF2,FF3,FF4 FAILURE MODE: ERRONEOUS OUTPUT TO LRU	
LEAD ANALYST: W. A. HAUFLER SUBSY	S LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FLIGHT CRITICAL FORWARD MDM (FF1 4) 5) 6) 7) 8) 9)	4)
CRITICALITIE	S
FLIGHT PHASE HDW/FUNC A PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1] B [P] C[P]
LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110	
CAUSES: VIBRATION, CORROSION, CONTAMIN	IATION
EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THIS ERRO PROCESSING. FAULT TOLERANCE DEPENDS ON VOTING LRUS. DETECTION DEPENDS ON SEPA SIGNALS. IF ALL REDUNDANCY FAILS, LOSE FORWARD RCS JETS, HAND CONTROLS (THC, RE INDICATORS.	I REDUNDANT STRINGS TO ARATE, REDUNDANT FEEDBACK E USE OF IMU TORQUING,
REFERENCES:	

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DATE: SUBSYSTEM: MDAC ID:	10/03/86 DPS 104		HIGHEST	CRITICALITY FLIGHT: ABORT:	•
	MDM FF1, F PREMATURE				
LEAD ANALYSI	: W. A. HAUF	FLER	SUBSYS LEA	AD: B. ROBB	
	ERARCHY: LEXER-DEMULTI CRITICAL FOF				
		CRITICA	LITIES		
PRELA LIFTC ONORE DEORE	PHASE HE NUNCH: DFF: DIT: DIT: NG/SAFING:	3/2R 3/1R 3/2R 3/1R	ABORT RTI TAI AOA ATO	HDW/FUN LS: 3/1R L: 3/1R L: 3/1R D: 3/1R	C
REDUNDANCY S	CREENS: A	[1]	В[Р]	С[Р]	
LOCATION: PART NUMBER:					
CAUSES: VIB	RATION, CORR	ROSION, CON	FAMINATION	ſ	
EFFECTS/RATIONALE: THIS FAILURE ON EITHER PORT CAN INTERFERE WITH FCOS RETURNING DATA FROM OTHER BTU(S) AND CAUSE HEALTHY BTU(S) TO BE BYPASSED. PORT MODING WILL NOT FIX A BLABBING MDM. POWER CYCLING MAY RESET ELECTRONICS, BUT CANNOT BE PERFORMED DURING ASCENT (POWER SWITCHES CANNOT BE REACHED), AND WILL NOT ALWAYS STOP PREMATURE OPERATIONS. IF ALL REDUNDANCY FAILS, LOSE USE OF IMU TORQUING, FORWARD RCS JETS, HAND CONTROLS (THC,RHC), MOST SWITCHES AND INDICATORS.					

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 105	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: MDM FF1,FF2,FF3,FF4 FAILURE MODE: PREMATURE OPERATION			
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (M 3) FLIGHT CRITICAL FORWARD MDM (4) 5) 6) 7) 8) 9)			
CRITICA	THIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110 CAUSES: VIBRATION, CORROSION, CON			
EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT STRINGS TO VOTING LRUS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE USE OF IMU TORQUING, FORWARD RCS JETS, HAND CONTROLS (THC,RHC), MOST SWITCHES AND INDICATORS.			

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DATE: 10/03/86 HIGHEST SUBSYSTEM: DPS MDAC ID: 106 ITEM: MDM FF1,FF2,FF3,FF4 FAILURE MODE: SELECTED ALL CHANNELS WRONG	CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
LEAD ANALYST: W. A. HAUFLER SUBSYS LEA	
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FLIGHT CRITICAL FORWARD MDM (FF14) 4) 5) 6) 7) 8) 9)	
CRITICALITIES	
	HDW/FUNC S: 3/lR : 3/lR : 3/lR : 3/lR
REDUNDANCY SCREENS: A [1] B [P]	
LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110	
CAUSES: VIBRATION, CORROSION, CONTAMINATION	
EFFECTS/RATIONALE: THE GPC'S FCOS AND THE LRUS WOULD REJECT ALL EXCEPT ANY DATA THAT HAPPENED TO BE IN THE S. EXPECTED DATA. REDUNDANCY MGT. SOON DETECTS MDM, AND THE EFFECTS OF WRONG DATA INPUT OR IF ALL REDUNDANCY FAILS, LOSE USE OF IMU TOR JETS, HAND CONTROLS (THC,RHC), MOST SWITCHES	AME FORMAT AS THE AND BYPASSES THAT OUTPUT IS MINIMIZED. QUING, FORWARD RCS
REFERENCES:	

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE: 3/1R FLIGHT: SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 107 MDM FF1, FF2, FF3, FF4 ITEM: FAILURE MODE: STUCK ON A CONSTANT OUTPUT TO LRU SUBSYS LEAD: B. ROBB LEAD ANALYST: W. A. HAUFLER BREAKDOWN HIERARCHY: DPS 1) MULTIPLEXER-DEMULTIPLEXERS (MDM) 2) FLIGHT CRITICAL FORWARD MDM (FF1..4) 3) 4) 5) 6) 7) 8) 9) CRITICALITIES ABORT HDW/FUNC FLIGHT PHASE HDW/FUNC 3/1R RTLS: PRELAUNCH: 3/2R 3/1R 3/1R LIFTOFF: TAL: AOA: 3/1R ONORBIT: 3/2R ATO: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT STRINGS TO VOTING LRUS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE USE OF IMU TORQUING, FORWARD RCS JETS, HAND CONTROLS (THC, RHC), MOST SWITCHES AND INDICATORS.

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 108 ITEM: MDM FF1,FF2,FF3,FF4 FAILURE MODE: FALSELY STUCK ON BUS	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
LEAD ANALYST: W. A. HAUFLER S BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MD 3) FLIGHT CRITICAL FORWARD MDM (F 4) 5) 6) 7) 8) 9)	M)		
CRITICAL			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
REDUNDANCY SCREENS: A [1]	В[Р] С[Р]		
LOCATION: AV BAY 1,2,3,2 PART NUMBER: MC615-0004-6110,5110			
CAUSES: VIBRATION, CORROSION, CONTA STRAP STUCK HIGH	MINATION, SCU BUSY CROSS-		
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM, BUT NOT ALLOWED DURING ASCENT UNTIL AFTER 2ND MDM FAILURE. IF ALL REDUNDANCY FAILS, LOSE USE OF IMU TORQUING, FORWARD RCS JETS, HAND CONTROLS (THC,RHC), MOST SWITCHES AND INDICATORS. REFERENCES:			

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE: 3/1R FLIGHT: SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 120 MDM FA1, FA2, FA3, FA4 ITEM: FAILURE MODE: LOSS OF OUTPUT TO GPC LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: DPS 1) MULTIPLEXER-DEMULTIPLEXERS (MDM) 2) 3) FLIGHT CRITICAL AFT MDM (FA1..4) 4) 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/1R PRELAUNCH: 3/2R 3/1R 3/1R TAL: LIFTOFF: 3/1R 3/2R AOA: ONORBIT: 3/1R ATO: 3/1R DEORBIT: LANDING/SAFING: 3/1R REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 4,5,6,6 PART NUMBER: MC615-0004-6110,5110 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM, BUT NOT ALLOWED DURING ASCENT UNTIL AFTER 2ND MDM FAILURE. IF ALL REDUNDANCY FAILS, LOSE USE OF AFT RCS, BODY FLAP, AILERONS, RUDDER, SPEEDBRAKE, AND ABILITY TO PURGE SSMES AND TANKS. **REFERENCES:**

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DATE: 10/03/86 HIG SUBSYSTEM: DPS MDAC ID: 121	HEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: MDM FA1, FA2, FA3, FA4 FAILURE MODE: LOSS OF OUTPUT TO LRU	
LEAD ANALYST: W. A. HAUFLER SUBSY	S LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FLIGHT CRITICAL AFT MDM (FAL 4) 5) 6) 7) 8)	
9)	
CRITICALITIE	29
FLIGHT PHASE HDW/FUNC A PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R	
FLIGHT PRACE DDW/FONC A	
PRELAUNCH: 3/2R	RILS: J/IR
LIFTOFF: 3/1R	TAL: 3/IR
ONORBIT: 3/2R	AOA: 3/1R
DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/1R	
REDUNDANCY SCREENS: A [1] B [P] C[P]
LOCATION: AV BAY 4,5,6,6 PART NUMBER: MC615-0004-6110,5110	
CAUSES: VIBRATION, CORROSION, CONTAMIN	ATION
EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THIS ERRO PROCESSING. FAULT TOLERANCE DEPENDS ON VOTING LRUS. DETECTION DEPENDS ON SEPA SIGNALS. IF ALL REDUNDANCY FAILS, LOSE FLAP, AILERONS, RUDDER, SPEEDBRAKE, AND	REDUNDANT STRINGS TO RATE, REDUNDANT FEEDBACK USE OF AFT RCS, BODY

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DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 122 ABORT: 3/1R ITEM: MDM FA1,FA2,FA3,FA4 FAILURE MODE: ERRONEOUS OUTPUT TO GPC
LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FLIGHT CRITICAL AFT MDM (FA14) 4) 5) 6) 7) 8) 9)
CRITICALITIES
CRITICALITIESFLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:3/1RLIFTOFF:3/1RTAL:3/1RONORBIT:3/2RAOA:3/1RDEORBIT:3/1RATO:3/1RLANDING/SAFING:3/1RATO:3/1R
REDUNDANCY SCREENS: A [1] B [P] C [P]
LOCATION: AV BAY 4,5,6,6 PART NUMBER: MC615-0004-6110,5110
CAUSES: VIBRATION, CORROSION, CONTAMINATION
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM, BUT NOT ALLOWED DURING ASCENT UNTIL AFTER 2ND MDM FAILURE. IF ALL REDUNDANCY FAILS, LOSE USE OF AFT RCS, BODY FLAP, AILERONS, RUDDER, SPEEDBRAKE, AND ABILITY TO PURGE SSMES AND TANKS.
REFERENCES:

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 123	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: MDM FA1,FA2,FA3,FA FAILURE MODE: ERRONEOUS OUTPUT T	.4 10 LRU
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (3) FLIGHT CRITICAL AFT MDM 4) 5) 6) 7) 8) 9)	MDM) (FAl4)
CRITIC	ALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R	ABORT HDW/FUNC
PRELAUNCH: 3/2R	RTLS: $3/1R$
LIFTOFF: 3/1R	TAL: $3/1R$
ONORBIT: 3/2R	AOA: 3/1R
ONORBIT: 3/2R DEORBIT: 3/1R	ATO: 3/1R
LANDING/SAFING: 3/1R	
REDUNDANCY SCREENS: A [1]	• •
LOCATION: AV BAY 4,5,6,6 PART NUMBER: MC615-0004-6110,511	,0
CAUSES: VIBRATION, CORROSION, CO	NTAMINATION
EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THI PROCESSING. FAULT TOLERANCE DEPE VOTING LRUS. DETECTION DEPENDS O	NDS ON REDUNDANT STRINGS TO

SIGNALS. IF ALL REDUNDANCY FAILS, LOSE USE OF AFT RCS, BODY FLAP, AILERONS, RUDDER, SPEEDBRAKE, AND ABILITY TO PURGE SSMES AND TANKS.

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DATE: SUBSYSTEM: MDAC ID:		FL	ICALITY HDW/FUNC IGHT: 3/lR ORT: 3/lR
ITEM: FAILURE MOD	MDM FA1, FA2, FA3, F E: PREMATURE OPERATI	FA4 ION TO GPC	
LEAD ANALYS	T: W. A. HAUFLER	SUBSYS LEAD: B	. ROBB
BREAKDOWN H 1) DPS 2) MULTIP 3) FLIGHT 4) 5) 6) 7) 8) 9)	IIERARCHY: PLEXER-DEMULTIPLEXERS CRITICAL AFT MDM	(MDM) (FAl4)	
	CRIT	CALITIES	
LIFT ONOR DEOR	PHASEHDW/FUNCAUNCH:3/2RCOFF:3/1RBIT:3/2RBIT:3/1RDING/SAFING:3/1R	'I'AL	3/1R 3/1R
LOCATION:	SCREENS: A [1] AV BAY 4,5,6,6 AV MC615-0004-6110,53		С[Р]
CAUSES: VI	BRATION, CORROSION,	CONTAMINATION	
EFFECTS/RATIONALE: THIS FAILURE ON EITHER PORT CAN INTERFERE WITH FCOS RETURNING DATA FROM OTHER BTU(S) AND CAUSE GOOD BTU(S) TO BE BYPASSED. PORT MODING WILL NOT FIX A BLABBING MDM. POWER CYCLING MAY RESET ELECTRONICS, BUT CANNOT BE PERFORMED DURING ASCENT (POWER SWITCHES CANNOT BE REACHED), AND WILL NOT ALWAYS STOP PREMATURE OPERATIONS. IF ALL REDUNDANCY FAILS, LOSE USE OF AFT RCS, BODY FLAP, AILERONS, RUDDER, SPEEDBRAKE, AND ABILITY TO PURGE SSMES AND TANKS.			
REFERENCES:	:		

DATE: SUBSYSTEM: MDAC ID:	DPS			CRITICALITY FLIGHT: ABORT:	
ITEM: FAILURE MOD	MDM FA E: PREMAT	l,FA2,FA3,F URE OPERATI	'A4 Con to lru		
LEAD ANALYS	r: W. A. H	AUFLER	SUBSYS LEA	AD: B. ROBB	
	LEXER-DEMU	LTIPLEXERS AFT MDM			
			CALITIES		
DEORI	PHASE AUNCH: DFF: BIT: BIT: LNG/SAFING	HDW/FUNC 3/2R 3/1R 3/2R 3/1R	ABORT RTI TAI	HDW/FUN LS: 3/1R L: 3/1R L: 3/1R L: 3/1R D: 3/1R	C
REDUNDANCY S	SCREENS:	A [1]	B [P]	С[Р]	
LOCATION: PART NUMBER:			10		
CAUSES: VIE	BRATION, C	ORROSION, C	ONTAMINATION	ſ	

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EFFECTS/RATIONALE:

FCOS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT STRINGS TO VOTING LRUS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE USE OF AFT RCS, BODY FLAP, AILERONS, RUDDER, SPEEDBRAKE, AND ABILITY TO PURGE SSMES AND TANKS.

DATE: 10/03 SUBSYSTEM: DPS MDAC ID: 126	/86	HIGHEST	CRITICALITY FLIGHT: ABORT:	
ITEM: MDM FAILURE MODE: SEL	FA1,FA2,FA3,FA ECTED ALL CHANN	4 IELS WRONG		
LEAD ANALYST: W. A	. HAUFLER	SUBSYS LEA	AD: B. ROBB	
BREAKDOWN HIERARCH 1) DPS 2) MULTIPLEXER-D 3) FLIGHT CRITIC 4) 5) 6) 7) 8) 9)	EMULTIPLEXERS (
	CRITIC	ALITIES		
FLIGHT PHASE	HDW/FUNC 3/2R 3/1R 3/2R 3/1R 3/1R	ABORT	HDW/FUN	ĩC
PRELAUNCH:	3/2R	RT	LS: 3/1R	
LIFTOFF:	3/1R			
DEORBIT:	3/1R	AU	3/1R	
LANDING/SAF	ING: 3/1R		-,	
REDUNDANCY SCREENS	: A []]	B [P]	C [P]	
LOCATION: AV E PART NUMBER: MC61		.0		
CAUSES: VIBRATION	, CORROSION, CO	NTAMINATIO	N	
EFFECTS/RATIONALE: THE GPC'S FCOS AND EXCEPT ANY DATA TH EXPECTED DATA. RE MDM, AND THE EFFEC IF ALL REDUNDANCY AILERONS, RUDDER, TANKS.	AT HAPPENED TO DUNDANCY MGT. S TS OF WRONG DAT FAILS, LOSE USE	BE IN THE S SOON DETECTS TA INPUT OR S OF AFT RCS	SAME FORMAT A 5 AND BYPASSE OUTPUT IS MI 5, BODY FLAP,	AS THE ES THAT INIMIZED.
REFERENCES:				1

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DATE: 10/03/86 HI SUBSYSTEM: DPS MDAC ID: 127	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: MDM FA1, FA2, FA3, FA4 FAILURE MODE: STUCK ON A CONSTANT OUT	IPUT TO LRU
LEAD ANALYST: W. A. HAUFLER SUBS	SYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FLIGHT CRITICAL AFT MDM (FAL. 4) 5) 6) 7) 8) 9)	
CRITICALITI	TES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1] B [[P] C[P]
LOCATION: AV BAY 4,5,6,6 PART NUMBER: MC615-0004-6110,5110	
CAUSES: VIBRATION, CORROSION, CONTAMI	INATION
EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THIS ERF PROCESSING. FAULT TOLERANCE DEPENDS O VOTING LRUS. DETECTION DEPENDS ON SEF SIGNALS. IF ALL REDUNDANCY FAILS, LOS FLAP, AILERONS, RUDDER, SPEEDBRAKE, AN	ON REDUNDANT STRINGS TO PARATE, REDUNDANT FEEDBACK SE USE OF AFT RCS, BODY

REFERENCES:

AND TANKS.

DATE: 10/03/86 HIC SUBSYSTEM: DPS MDAC ID: 128	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: MDM FA1,FA2,FA3,FA4 FAILURE MODE: FALSELY STUCK ON BUSY MO	ODE
LEAD ANALYST: W. A. HAUFLER SUBS	YS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FLIGHT CRITICAL AFT MDM (FA1. 4) 5) 6) 7) 8) 9)	.4)
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1] B [P] C[P]
LOCATION: AV BAY 4,5,6,6 PART NUMBER: MC615-0004-6110,5110	
CAUSES: VIBRATION, CORROSION, CONTAMI STRAP STUCK HIGH	NATION, SCU BUSY CROSS-
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA THAT DATA. FCOS BYPASSES MDM AFTER 2ND AND DISPLAYS FAULT MSG ON CRTS. PORT 1 NOT ALLOWED DURING ASCENT UNTIL AFTER 3 REDUNDANCY FAILS, LOSE USE OF AFT RCS, RUDDER, SPEEDBRAKE, AND ABILITY TO PURC REFERENCES:	D CONSECUTIVE COMMFAULT, MODING MAY RECOVER MDM, BUT 2ND MDM FAILURE. IF ALL BODY FLAP, AILERONS,

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 140	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/3	
ITEM: MDM PF1,PF2 FAILURE MODE: LOSS OF OUTPUT TO	GPC	
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS 3) PAYLOAD FORWARD MDM 4) 5) 6) 7) 8) 9)	(MDM) (PF12)	
CRIT	CALITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/3 LANDING/SAFING: 3/3	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3	
REDUNDANCY SCREENS: A [1] LOCATION: AV BAY 1,2	B[P] C[P]	
PART NUMBER: MC615-0004-6710,5		
CAUSES: VIBRATION, CORROSION, C EFFECTS/RATIONALE: FCOS/BSS SETS COMMFAULT FLAG FOR IGNORES THAT DATA. SYSTEM SOFTW CONSECUTIVE COMMFAULT, AND DISPI MODING MAY NOT RECOVER MDM. IF ABILITY TO RELEASE, OPEN, CLOSE, ABILITY TO CRADLE AND LATCH RMS REFERENCES:	THAT DATA. APPLICATION SW ARE BYPASSES MDM AFTER 2ND AYS FAULT MSG ON CRTS. PORT ALL REDUNDANCY FAILS, LOSE AND LATCH PAYLOAD BAY DOORS, AND	

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DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 141 ABORT: 3/3 ITEM: MDM PF1,PF2
FAILURE MODE: LOSS OF OUTPUT TO LRU
LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PAYLOAD FORWARD MDM (PF12) 4) 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/1RAOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [1] B [P] C [P]
LOCATION: AV BAY 1,2 PART NUMBER: MC615-0004-6710,5710
CAUSES: VIBRATION, CORROSION, CONTAMINATION
EFFECTS/RATIONALE: FCOS/BSS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT PF MDMS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE ABILITY TO RELEASE, OPEN, CLOSE, AND LATCH PAYLOAD BAY DOORS, AND ABILITY TO CRADLE AND LATCH RMS ARM WITHOUT AN EVA.
REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 142	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/3
ITEM: MDM PF1,PF2 FAILURE MODE: ERRONEOUS OUTPO	UT TO GPC
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXEN 3) PAYLOAD FORWARD MDM 4)	RS (MDM) (PF12)
5) 6) 7) 8) 9)	
	ITICALITIES
FLIGHT PHASE HDW/FUNG PRELAUNCH: 3/2R LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/3 LANDING/SAFING: 3/3	C ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: AV BAY 1,2 PART NUMBER: MC615-0004-6710, CAUSES: VIBRATION, CORROSION,	
IGNORES THAT DATA. SYSTEM SON CONSECUTIVE COMMFAULT, AND DIS MODING MAY NOT RECOVER MDM. J ABILITY TO RELEASE, OPEN, CLOS ABILITY TO CRADLE AND LATCH RM	SPLAYS FAULT MSG ON CRTS. PORT IF ALL REDUNDANCY FAILS, LOSE SE, AND LATCH PAYLOAD BAY DOORS, AND
REFERENCES:	

DATE:10/03/86HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:DPSFLIGHT:3/1RMDAC ID:143ABORT:3/3	
ITEM: MDM PF1,PF2 FAILURE MODE: ERRONEOUS OUTPUT TO LRU	
LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PAYLOAD FORWARD MDM (PF12) 4) 5) 6) 7) 8) 9)	
CRITICALITIES	
FLICHT PHASE HOW/FUNC ABORT HOW/FUNC	
PRELAUNCH:3/2RRTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/1RAOA:3/3	
LIFTOFF: 3/3 TAL: 3/3	
ONORBIT: 3/1R AOA: 3/3	
PRELAUNCH:3/2RRTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/1RAOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3	
REDUNDANCY SCREENS: A [1] B [P] C [P]	
LOCATION: AV BAY 1,2 PART NUMBER: MC615-0004-6710,5710	
CAUSES: VIBRATION, CORROSION, CONTAMINATION	
EFFECTS/RATIONALE: FCOS/BSS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT PF MDMS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE ABILITY TO RELEASE, OPEN, CLOSE, AND LATCH PAYLOAD BAY DOORS, AND ABILITY TO CRADLE AND LATCH RMS ARM WITHOUT AN EVA.	
REFERENCES:	

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 144	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/3
ITEM: MDM PF1,PF2 FAILURE MODE: PREMATURE OPERATIO	ON TO GPC
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB
4) 5) 6) 7) 8)	(MDM) (PF12)
9)	
CRITIC FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/3 ONORBIT: 3/1R DEORBIT: 3/3 LANDING/SAFING: 3/3	RTLS: 3/3
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: AV BAY 1,2 PART NUMBER: MC615-0004-6710,571 CAUSES: VIBRATION, CORROSION, CO	
EFFECTS/RATIONALE: THIS FAILURE ON EITHER PORT CAN I DATA FROM OTHER PF MDM AND CAUSE MODING WILL NOT FIX A BLABBING ME ELECTRONICS, BUT WILL NOT ALWAYS ALL REDUNDANCY FAILS, LOSE ABILIT LATCH PAYLOAD BAY DOORS, AND ABII	INTERFERE WITH FCOS/BSS RETURNING GOOD MDM TO BE BYPASSED. PORT DM. POWER CYCLING MAY RESET STOP PREMATURE OPERATIONS. IF TY TO RELEASE, OPEN, CLOSE, AND

REFERENCES:

WITHOUT AN EVA.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 FLIGHT: 3/1R SUBSYSTEM: DPS 3/3 ABORT: MDAC ID: 145 ITEM: MDM PF1, PF2 FAILURE MODE: PREMATURE OPERATION TO LRU LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) PAYLOAD FORWARD MDM (PF1..2) 3) 4) 5) 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC 3/3 RTLS: PRELAUNCH: 3/2R 3/3 LIFTOFF: 3/3 TAL: AOA: 3/3 ONORBIT: 3/1R ATO: DEORBIT: 3/3 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 1,2 PART NUMBER: MC615-0004-6710,5710 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS/BSS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT PF MDMS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE ABILITY TO RELEASE, OPEN, CLOSE, AND LATCH PAYLOAD BAY DOORS, AND ABILITY TO CRADLE AND LATCH RMS ARM WITHOUT AN EVA. **REFERENCES:**

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DATE:10/03/86HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:DPSFLIGHT:3/1RMDAC ID:146ABORT:3/3
ITEM: MDM PF1, PF2 FAILURE MODE: SELECTED ALL CHANNELS WRONG
LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PAYLOAD FORWARD MDM (PF12) 4)
5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:3/3LIFTOFF:3/3TAL:3/3ONORBIT:3/1RAOA:3/3DEORBIT:3/3ATO:3/3LANDING/SAFING:3/3ATO:3/3
REDUNDANCY SCREENS: A [1] B [P] C [P]
LOCATION: AV BAY 1,2 PART NUMBER: MC615-0004-6710,5710
CAUSES: VIBRATION, CORROSION, CONTAMINATION
EFFECTS/RATIONALE: THE GPC'S FCOS AND THE LRUS WOULD REJECT ALL DATA FROM THAT MDM EXCEPT ANY DATA THAT HAPPENED TO BE IN THE SAME FORMAT AS THE EXPECTED DATA. REDUNDANCY MGT. SOON DETECTS AND BYPASSES THAT MDM, AND THE EFFECTS OF WRONG DATA INPUT OR OUTPUT IS MINIMIZED. IF ALL REDUNDANCY FAILS, LOSE ABILITY TO RELEASE, OPEN, CLOSE, AND LATCH PAYLOAD BAY DOORS, AND ABILITY TO CRADLE AND LATCH RMS

REFERENCES:

ARM WITHOUT AN EVA.

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HDW/FUNC HIGHEST CRITICALITY 10/03/86 DATE: FLIGHT: 3/1R SUBSYSTEM: DPS ABORT: 3/3 147 MDAC ID: MDM PF1, PF2 ITEM: FAILURE MODE: STUCK ON A CONSTANT OUTPUT TO LRU LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: 1) DPS MULTIPLEXER-DEMULTIPLEXERS (MDM) 2) PAYLOAD FORWARD MDM (PF1..2) 3) 4) 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC HDW/FUNC ABORT FLIGHT PHASE 3/2R RTLS: 3/3 PRELAUNCH: 3/3 TAL: LIFTOFF: 3/3 3/3 3/1R AOA: ONORBIT: ATO: 3/3 3/3 DEORBIT: LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [1] B [P] C [P] AV BAY 1,2 LOCATION: PART NUMBER: MC615-0004-6710,5710 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS/BSS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT PF MDMS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE ABILITY TO RELEASE, OPEN, CLOSE, AND LATCH PAYLOAD BAY DOORS, AND ABILITY TO CRADLE AND LATCH RMS ARM WITHOUT AN EVA.

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 148	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/3
ITEM: MDM PF1,PF2 FAILURE MODE: FALSELY STUCK ON	BUSY MODE
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS 3) PAYLOAD FORWARD MDM 4) 5) 6) 7) 8) 9)	(MDM) (PF12)
	CALITIES
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/2RLIFTOFF:3/3ONORBIT:3/1RDEORBIT:3/3LANDING/SAFING:3/3	ABORT HDW/FUNC RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO: 3/3
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: AV BAY 1,2 PART NUMBER: MC615-0004-6710,57	10
CAUSES: VIBRATION, CORROSION, CO STRAP STUCK HIGH	ONTAMINATION, SCU BUSY CROSS-
EFFECTS/RATIONALE: FCOS/BSS SETS COMMFAULT FLAG FOR IGNORES THAT DATA. SYSTEM SOFTWA CONSECUTIVE COMMFAULT, AND DISPLA MODING MAY NOT RECOVER MDM. IF A ABILITY TO RELEASE, OPEN, CLOSE, ABILITY TO CRADLE AND LATCH RMS A	ARE BYPASSES MDM AFTER 2ND AYS FAULT MSG ON CRTS. PORT ALL REDUNDANCY FAILS, LOSE AND LATCH PAYLOAD BAY DOORS, AND
REFERENCES:	

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<pre>ITEM: MDM LF1,LA1 FAILURE MODE: LOSS OF OUTPUT TO GPC LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PRELAUNCH FORWARD & AFT MDM (LF,LA) 4) 5) 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/2R RTLS: /NA LIFTOFF: /NA TAL: /NA ONORBIT: /NA AOO: /NA LENDING/SAFING: 3/2R REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 1,6 PART NUMBER: MCG15-0004-6610,5600 CAUSES: VIERATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL EVENTME UNUPD </pre>
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) FRELAUNCH FORWARD & AFT MDM (LF,LA) 4) 5) 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/2R RTLS: /NA LIFTOFF: /NA TAL: /NA ONORBIT: /NA AOA: /NA DEORBIT: /NA AOA: /NA LANDING/SAFING: 3/2R REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,5600 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL
<pre>1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PRELAUNCH FORWARD & AFT MDM (LF, LA) 4) 5) 6) 7) 8) 9) CRITICALITIES FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/2R RTLS: /NA LIFTOFF: /NA TAL: /NA ONORBIT: /NA AOA: /NA DEORBIT: /NA ACO: /NA LANDING/SAFING: 3/2R REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,5600 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL</pre>
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:/NALIFTOFF:/NATAL:/NAONORBIT:/NAAOA:/NADEORBIT:/NAATO:/NALANDING/SAFING:3/2RATO:/NAREDUNDANCY SCREENS:A [1]B [P]C [P]LOCATION:AV BAY 1,6PART NUMBER:MC615-0004-6610,5600CAUSES:VIBRATION, CORROSION, CONTAMINATIONEFFECTS/RATIONALE:FCOS SETS COMMFAULT FLAG FOR THAT DATA.APPLICATION SW IGNORESTHAT DATA.FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT,AND DISPLAYS FAULT MSG ON CRTS.PORT MODING MAY RECOVER MDM.ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL
PRELAUNCH:3/2RRTLS:/NALIFTOFF:/NATAL:/NAONORBIT:/NAAOA:/NADEORBIT:/NAATO:/NALANDING/SAFING:3/2RATO:/NAREDUNDANCY SCREENS:A [1]B [P]C [P]LOCATION:AV BAY 1,6PART NUMBER:MC615-0004-6610,5600CAUSES:VIBRATION, CORROSION, CONTAMINATIONEFFECTS/RATIONALE:FCOS SETS COMMFAULT FLAG FOR THAT DATA.APPLICATION SW IGNORESTHAT DATA.FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT,AND DISPLAYS FAULT MSG ON CRTS.PORT MODING MAY RECOVER MDM.ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL
LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,5600 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL
PART NUMBER: MC615-0004-6610,5600 CAUSES: VIBRATION, CORROSION, CONTAMINATION EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL
FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL
SYSTEMS WHILE ATTACHED.
REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 181	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: /NA
ITEM: MDM LF1,LA1 FAILURE MODE: LOSS OF OUTPUT TO LR	
LEAD ANALYST: W. A. HAUFLER S	UBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MD 3) PRELAUNCH FORWARD & AFT MDM (1 4) 5) 6) 7) 8) 9)	
CRITICAL	JITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: /NA ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: 3/2R	ABORT HDW/FUNC RTLS: /NA TAL: /NA AOA: /NA ATO: /NA
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,5600	
CAUSES: VIBRATION, CORROSION, CONT	AMINATION
EFFECTS/RATIONALE: FCOS DOES NOT DIRECTLY DETECT THIS PROCESSING. FAULT TOLERANCE DEPEND VOTING LRUS. DETECTION DEPENDS ON SIGNALS. IF ALL REDUNDANCY FAILS, AND CONTROL SYSTEMS WHILE ATTACHED. REFERENCES:	S ON REDUNDANT STRINGS TO SEPARATE, REDUNDANT FEEDBACK LOSE ABILITY OF GSE TO MONITOR

SUBSYSTEM: DPS FLIG	ALITY HDW/FUNC HT: 3/2R T: /NA
ITEM: MDM LF1,LA1 FAILURE MODE: ERRONEOUS OUTPUT TO GPC	
LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B.	ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PRELAUNCH FORWARD & AFT MDM (LF,LA) 4) 5) 6) 7) 8) 9)	
CRITICALITIES	
FLIGHT PHASE HDW/FUNC ABORT H PRELAUNCH: 3/2R RTLS: LIFTOFF: /NA TAL: ONORBIT: /NA AOA: DEORBIT: /NA ATO: LANDING/SAFING: 3/2R	DW/FUNC /NA /NA /NA /NA
REDUNDANCY SCREENS: A [1] B [P] C LOCATION: AV BAY 1,6	[P]
PART NUMBER: MC615-0004-6610,5600	
CAUSES: VIBRATION, CORROSION, CONTAMINATION	
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATI THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIV AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY R NOT ALLOWED DURING ASCENT UNTIL AFTER 2ND MDM FAIL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR A SYSTEMS WHILE ATTACHED.	E COMMFAULT, ECOVER MDM, BUT URE. IF ALL
REFERENCES:	

DATE: SUBSYSTEM: MDAC ID:		HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 3/2R /NA
	MDM LF1,LA1 E: ERRONEOUS OUTPUT T	O LRU and and	- <u>-</u>	· · · · · · · · · · · · · · · · · · ·
LEAD ANALYS	T: W. A. HAUFLER	SUBSYS LEAD	: B. ROBB	
BREAKDOWN HI 1) DPS 2) MULTIPI 3) PRELAUI 4) 5) 6) 7) 8) 9)	IERARCHY: LEXER-DEMULTIPLEXERS () NCH FORWARD & AFT MDM	MDM) (LF,LA)		
	CRITIC	ALITIES		
FLIGHT	PHASE HDW/FUNC	ABORT	HDW/FUN	C
PREL		RTLS TAL: AOA:	: /NA	-
LIFT	OFF: /NA	TAL:	/NA	
ONOR	BIT: /NA	AOA:	/NA	
DEOR	OFF: /NA BIT: /NA BIT: /NA	ATO:	/NA	
	ING/SAFING: 3/2R			
REDUNDANCY :	SCREENS: A [1]	B [P]	C [P]	
	AV BAY 1,6 : MC615-0004-6610,560	0	•	
CAUSES: VI	BRATION, CORROSION, CO	NTAMINATION	و المحمود المحمود المحمد المحمد الم	
EFFECTS/RAT	TONALE:			
FCOS DOES NO	OT DIRECTLY DETECT THI FAULT TOLERANCE DEPE	S ERROR VIA I	MDM RETURN	WORD 5 TO
	. DETECTION DEPENDS OF			
STONALS T	F ALL REDUNDANCY FAILS	LOSE ABILT	TY OF GSE TO	MONTTOR
AND CONTROL	SYSTEMS WHILE ATTACHE	D.		
REFERENCES:				
				· · · · ·

DATE: 10/03/86 1 SUBSYSTEM: DPS MDAC ID: 184	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: /NA
ITEM: MDM LF1,LA1 FAILURE MODE: PREMATURE OPERATION TO) GPC
LEAD ANALYST: W. A. HAUFLER SUI	BSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM 3) PRELAUNCH FORWARD & AFT MDM (LF 4) 5) 6) 7) 8) 9)) , LA)
CRITICALI	TIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: /NA ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: 3/2R	ABORT HDW/FUNC RTLS: /NA TAL: /NA AOA: /NA ATO: /NA
REDUNDANCY SCREENS: A [1] B	[P] C [P]
LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,5600 CAUSES: VIBRATION, CORROSION, CONTAN	MINATION
EFFECTS/RATIONALE: THIS FAILURE ON EITHER PORT CAN INTED DATA FROM OTHER BTU(S) AND CAUSE GOOD PORT MODING WILL NOT FIX A BLABBING D ELECTRONICS, BUT WILL NOT ALWAYS STOD ALL REDUNDANCY FAILS, LOSE ABILITY OF SYSTEMS WHILE ATTACHED.	RFERE WITH FCOS RETURNING D BTU(S) TO BE BYPASSED. MDM. POWER CYCLING MAY RESET P PREMATURE OPERATIONS. IF

REFERENCES:

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DATE: 10/03/86 H SUBSYSTEM: DPS MDAC ID: 185	IIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: /NA
ITEM: MDM LF1,LA1 FAILURE MODE: PREMATURE OPERATION TO	LRU A CARACTER AND A
LEAD ANALYST: W. A. HAUFLER SUB	SYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PRELAUNCH FORWARD & AFT MDM (LF, 4) 5) 6) 7) 8) 9)	IX Sector
CRITICALIT	TES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: /NA ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: 3/2R	ABORT HDW/FUNC RTLS: /NA TAL: /NA AOA: /NA ATO: /NA
REDUNDANCY SCREENS: A [1] B	[P] C[P]
LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,5600	
CAUSES: VIBRATION, CORROSION, CONTAM	INATION
EFFECTS/RATIONALE:	

FCOS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT STRINGS TO VOTING LRUS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL SYSTEMS WHILE ATTACHED.

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 186	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: /NA
ITEM: MDM LF1,LA1 FAILURE MODE: SELECTED ALL CHANN	IELS WRONG
LEAD ANALYST: W. A. HAUFLER	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (3) PRELAUNCH FORWARD & AFT MDM 4) 5) 6) 7) 8) 9)	MDM) (LF,LA)
CRITIC	CALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: /NA ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: 3/2R	ABORT HDW/FUNC RTLS: /NA TAL: /NA AOA: /NA ATO: /NA
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,560 CAUSES: VIBRATION, CORROSION, CO	
EFFECTS/RATIONALE: THE GPC'S FCOS AND THE LRUS WOULD EXCEPT ANY DATA THAT HAPPENED TO EXPECTED DATA. REDUNDANCY MGT. S MDM, AND THE EFFECTS OF WRONG DAT IF ALL REDUNDANCY FAILS, LOSE ABI CONTROL SYSTEMS WHILE ATTACHED. REFERENCES:	BE IN THE SAME FORMAT AS THE SOON DETECTS AND BYPASSES THAT TA INPUT OR OUTPUT IS MINIMIZED.

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 187	HIGHEST	CRITICALITY HDW/FT FLIGHT: 3/21 ABORT: /N	R
ITEM: MDM LF1,LA1 FAILURE MODE: STUCK ON A C	ONSTANT OUTPUT	O LRU	
LEAD ANALYST: W. A. HAUFLER	SUBSYS LI	AD: B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLE 3) PRELAUNCH FORWARD & AE 4) 5) 6) 7) 8) 9)			• · ·
	CRITICALITIES		
	UNC ABORT R RT A TA A AC A AT	LS: /NA L: /NA	
REDUNDANCY SCREENS: A [1] B[P]	С[Р]	
LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-66	·		
CAUSES: VIBRATION, CORROSI	ON, CONTAMINATIC	N	
EFFECTS/RATIONALE:			

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FCOS DOES NOT DIRECTLY DETECT THIS ERROR VIA MDM RETURN WORD PROCESSING. FAULT TOLERANCE DEPENDS ON REDUNDANT STRINGS TO VOTING LRUS. DETECTION DEPENDS ON SEPARATE, REDUNDANT FEEDBACK SIGNALS. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL SYSTEMS WHILE ATTACHED.

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DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 188 ABORT: /NA	2		
ITEM: MDM LF1,LA1 FAILURE MODE: FALSELY STUCK ON BUSY MODE			
LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB			
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIPLEXER-DEMULTIPLEXERS (MDM) 3) PRELAUNCH FORWARD & AFT MDM (LF,LA) 4) 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/2R RTLS: /NA LIFTOFF: /NA TAL: /NA ONORBIT: /NA AOA: /NA DEORBIT: /NA ATO: /NA LANDING/SAFING: 3/2R			
REDUNDANCY SCREENS: A [1] B [P] C [P]			
LOCATION: AV BAY 1,6 PART NUMBER: MC615-0004-6610,5600			
CAUSES: VIBRATION, CORROSION, CONTAMINATION, SCU BUSY CROSS- STRAP STUCK HIGH			
EFFECTS/RATIONALE: FCOS SETS COMMFAULT FLAG FOR THAT DATA. APPLICATION SW IGNORES THAT DATA. FCOS BYPASSES MDM AFTER 2ND CONSECUTIVE COMMFAULT, AND DISPLAYS FAULT MSG ON CRTS. PORT MODING MAY RECOVER MDM. IF ALL REDUNDANCY FAILS, LOSE ABILITY OF GSE TO MONITOR AND CONTROL SYSTEMS WHILE ATTACHED.			
REFERENCES:			

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DATE: 10/03/86 E SUBSYSTEM: DPS MDAC ID: 201	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: INPUT/OUTPUT PROCESSOF FAILURE MODE: LOSS OF OUTPUT	(IOP)		
LEAD ANALYST: T. B. CRIBBS SUBS	YS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) INPUT/OUTPUT PROCESSOR (IOP) 4) 5) 6) 7) 8) 9)	 Construction of the second seco		
CRITICALIT FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R			
REDUNDANCY SCREENS: A [1] B	[P] C[P]		
LOCATION: AV BAYS PART NUMBER:			
CAUSES: MIA FAILS TO OUTPUT TO DATA BUS DUE TO PIECE/PART FAILURE FROM CONTAMINATION OR MECHANICAL, THERMAL, OR ELECTRICAL OVERSTRESS, OR POWER FAILURE			
EFFECTS/RATIONALE: LOSS OF A BUS-COMMANDING MIA RESULTS TO COMMUNICATE OVER THAT BUS, ATTACHE (BTU'S), AND ALL INPUTS AND OUTPUTS C DYNAMIC FLIGHT PHASES, WHERE A SINGLE THE CREW WOULD HAVE TO MANUALLY INTER AND SWITCHING TRANSIENTS COULD ARISE. WOULD CAUSE LOSS OF VEHICLE CONTROL. REFERENCES: JSC 18820, JSC 11174, JS	D BUS TERMINAL UNITS ONNECTED TO THOSE BTU'S. IN BTU CONTROLS AN ACTUATOR, VENE ON A SINGLE FAILURE, LOSS OF ALL REDUNDANCY		

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 202	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: INPUT/OUTPUT PROCE FAILURE MODE: ERRATIC/ERRONEOUS	SSOR (IOP) OUTPUT		
LEAD ANALYST: T. B. CRIBBS	SUBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) INPUT/OUTPUT PROCESSOR (IOP) 4) 5) 6) 7) 8) 9)			
CRITIC	CALITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R		
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: AV BAYS PART NUMBER:			
CAUSES: COMPONENT FAILURE DUE TO CONTAMINATION OR MECHANICAL, THERMAL, OR ELECTRICAL OVERSTRESS IN MIA, ALU, MUX, LOCAL STORE, OR MEMORY			
EFFECTS/RATIONALE: CRITICAL GPC OUTPUTS ARE VALIDATED BY SUMWORD COMPARISON; HOWEVER, ERRORS ARE DOWNLINKED AND LOGGED, BUT NOT CORRECTED. MDM/ACTUATOR HARDWARE CANCELS THE EFFECTS OF AN ERRONEOUS OUTPUT FROM A SINGLE CHANNEL BY "FORCE FIGHTING", BUT MULTIPLE FAILURES DURING CRITICAL FLIGHT PHASES WOULD LIKELY RESULT IN LOSS OF VEHICLE/LIFE.			
REFERENCES: JSC 18820, JSC 11174	4, JSC 12770		

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 203	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R		
ITEM: INPUT/OUTPUT PROCESS FAILURE MODE: PREMATURE OPERATION	OR (IOP)		
LEAD ANALYST: T. B. CRIBBS SU	BSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) INPUT/OUTPUT PROCESSOR (IOP) 4) 5) 6) 7) 8) 9)			
CRITICAL	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 2/1R ONORBIT: 3/2R DEORBIT: 2/1R LANDING/SAFING: 2/1R	ABORTHDW/FUNCRTLS:2/1RTAL:2/1RAOA:3/1RATO:3/1R		
REDUNDANCY SCREENS: A [1]	В[Р] С[Р]		
LOCATION: AV BAYS PART NUMBER:			
CAUSES: CONTROL MONITOR, CHANNEL CONTROL, MSC, OR MICROCODE STORE FAILURE RESULTS IN INVALID EXECUTION OF PROGRAM. CAUSED BY PIECE/PART FAILURE.			
EFFECTS/RATIONALE: PREMATURE ISSUANCE OF CRITICAL OUTPUTS IS DETECTED BY OTHER GPC'S IN THE REDUNDANT SET. GPC FAILS TO SYNC AND STRINGS ARE BYPASSED BY OTHER GPC'S. FAULTY COMMANDS ARE STILL PASSED TO THE ACTUATOR BY FAILED GPC. PREMATURE COMMANDS TO ACTUATORS DURING DYNAMIC FLIGHT PHASES WOULD LIKELY RESULT IN LOSS OF VEHICLE/LIFE, IF ACTUATOR REDUNDANCY WAS LOST OR IF SIMULTANEOUS LOSS OF TWO OUTPUT CHANNELS. REFERENCES: JSC 18820, JSC 11174, JSC 12770			
REFERENCES: JSC 18820, JSC 11174, C	JSC 12//U		

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 204		ITICALITY FLIGHT: ABORT:	
ITEM: INPUT/OUTPUT PROCESS FAILURE MODE: ERRONEOUS INPUT	OR (IOP)		
LEAD ANALYST: T. B. CRIBBS SU	BSYS LEAD:	B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) INPUT/OUTPUT PROCESSOR (IOP) 4) 5) 6) 7) 8) 9)			
CRITICAL	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/3	TAL: AOA:	HDW/FUN 3/1R 3/1R 3/1R 3/1R 3/1R	с
REDUNDANCY SCREENS: A [1]	B [P]	С[Р]	
LOCATION: AV BAYS PART NUMBER:			-
CAUSES: COMPONENT FAILURE DUE TO CONTAMINATION OR MECHANICAL, THERMAL, OR ELECTRICAL OVERSTRESS IN MIA, ALU, MUX, LOCAL STORE, MEMORY, OR DMA QUEUE			
EFFECTS/RATIONALE: CRITICAL GPC/IOP INPUTS ARE VALIDATED THRU PARITY CHECKING. RECURRING INPUT ERRORS RESULT IN EITHER GPC "FAIL-TO-SYNC" BRINGING DOWN AN ERRING GPC, OR IGNORING INPUTS FROM AN ERRING MDM VIA A GPC MASK. ERRONEOUS INPUTS, IF PROPAGATED THROUGH THE GPC, COULD RESULT IN ERRONEOUS COMMAND OUTPUTS AND LOSS OF VEHICLE/LIFE, IF COMPLETE FUNCTION WAS LOST.			

REFERENCES: JSC 18820, JSC 11174, JSC 12770

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 205	HIGHEST CI	RITICALITY FLIGHT: ABORT:	
ITEM: CENTRAL PROCESSING UN FAILURE MODE: LOSS OF OUTPUT	IIT (CPU)		
LEAD ANALYST: T. B. CRIBBS SUE	SYS LEAD:	B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) CENTRAL PROCESSING UNIT (CPU) 4) 5) 6) 7) 8) 9)			
CRITICALI	TIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT RTLS: TAL: AOA: ATO:	•	
REDUNDANCY SCREENS: A [1] B	[P]	С[Р]	
LOCATION: AV BAYS PART NUMBER:			
CAUSES: CPU FAILS TO FUNCTION DUE TO LOSS OF POWER OR FAILURE OF MEMORY TIMING PAGE			
EFFECTS/RATIONALE: IN DYNAMIC FLIGHT PHASES WHERE REDUNDANT SET (RS) IS OPERATING, OTHER GPC'S RECOGNIZE GPC FAILING TO SYNC AND ISSUE FAIL VOTES AGAINST IT. THE FAILING GPC'S VOTING LOGIC THEN REMOVES IT FROM THE RS. FOUR RS GPC'S CONTROL CRITICAL FLIGHT FUNCTIONS; IF AT LEAST THREE ARE LOST, THE 5TH GPC (BACKUP FLIGHT COMPUTER, BFS) IS ENGAGED. LOSS OF BFS WOULD RESULT IN LOSS OF VEHICLE/LIFE. REFERENCES: JSC 18820, JSC 11174, JSC 12770			

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 206	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: CENTRAL PROCESSING FAILURE MODE: ERRONEOUS/ERRATIC (
LEAD ANALYST: T. B. CRIBBS	SUBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) CENTRAL PROCESSING UNIT (CPU) 4) 5) 6) 7) 8) 9)			
CRITIC	ALITIES		
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/2RLIFTOFF:3/1RONORBIT:3/3DEORBIT:3/1RLANDING/SAFING:3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: AV BAYS PART NUMBER:			
CAUSES: CPU OUTPUTS INVALID DATA TO IOP DUE TO MEMORY PARITY ERROR, OR FAILURE OF MASTER BUS CONTROL, ALU, DATA FLOW MUX, OR LOCAL STORE			
EFFECTS/RATIONALE: CRITICAL GPC OUTPUTS ARE VALIDATED BY SUMWORD COMPARISON TO OUTPUTS FROM REDUNDANT GPC'S; HOWEVER, DETECTED ERRORS ARE MERELY LOGGED AND DOWNLINKED WITHOUT CORRECTIVE ACTION. INVALID COMMAND OUTPUTS ARE PASSED THROUGH BUS TERMINAL UNITS (BTU'S) TO ACTUATORS WHICH "FORCE FIGHT" THE REDUNDANT COMMANDS IN ORDER TO VOTE OUT THE ERRONEOUS COMMAND. LOSS OF MORE THAN ONE OUTPUT CHANNEL TO THE SAME ACTUATOR WOULD REQUIRE CREW INTERVENTION, POSSIBLY CAUSING UNSTABLE SWITCHOVER TRANSIENTS.			

REFERENCES: JSC 18820, JSC 11174, JSC 12770

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10/03/86 HIGHEST CRITICALITY HDW/FUNC DATE: FLIGHT: 3/1R SUBSYSTEM: DPS ABORT: 3/1R MDAC ID: 207 CENTRAL PROCESSING UNIT (CPU) ITEM: FAILURE MODE: DELAYED/PREMATURE/INADVERTENT OPERATION LEAD ANALYST: T. B. CRIBBS SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: 1) DPS GENERAL PURPOSE COMPUTER (GPC) 2) CENTRAL PROCESSING UNIT (CPU) 3) 4) 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/2R 3/1R RTLS: TAL: 3/1<u>R</u> 3/1R PRELAUNCH: LIFTOFF: TAL: AOA: ATO: ONORBIT: 3/3 DEORBIT: 3/1R LANDING/SAFING: 3/1R 3/1R 3/1R REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAYS PART NUMBER: CAUSES: CPU ATTEMPTS TO OUTPUT DATA AT INAPPROPRIATE TIME DUE TO PROCESSOR SLOW-DOWN WHILE SERVICING RECURRING I/O ERRORS, FAILURE OF INTERRUPT LOGIC, OR INTERMITTENCE IN TIMING PAGE. EFFECTS/RATIONALE: REDUNDANT SET GPC'S SYNC UP BY WAITING FOR SYNC POINT MESSAGES FROM OTHER GPC'S TO INDICATE COMPLETION OF IDENTICAL OPERATIONS. EXCESSIVE PROCESSOR LOAD COULD REQUIRE ALL GPC'S TO WAIT EXCESSIVELY, BUT EACH GPC WOULD RECOGNIZE THE SLOW DOWN AND ISSUE A FAIL-TO-SYNC VOTE, AND THE SLOW GPC'S VOTING LOGIC WOULD REMOVE IT FROM THE RS. IF PERFORMANCE OF ALL GPC'S WAS DEGRADED DURING DYNAMIC FLIGHT PHASES, VEHICLE INSTABILITY COULD OCCUR UNLESS CREW TOOK CONTROL.

REFERENCES: JSC 18820, JSC 11174, JSC 12770

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 208	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 2/1R ABORT: 2/1R		
ITEM: CENTRAL PROCESSING U FAILURE MODE: INADVERTENT OPERATIO	INIT (CPU))N		
LEAD ANALYST: T. B. CRIBBS SU	JBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) CENTRAL PROCESSING UNIT (CPU) 4) 5) 6) 7) 8) 9)			
CRITICAI			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 2/1R ONORBIT: 3/3 DEORBIT: 2/1R LANDING/SAFING: 2/1R	ABORTHDW/FUNCRTLS:2/1RTAL:2/1RAOA:2/1RATO:2/1R		
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: AV BAYS PART NUMBER:			
CAUSES: CPU ATTEMPTS TO OUTPUT DATA ON INCORRECT DATA BUS DUE TO ERRORS IN MEMORY LOCATIONS CONTAINING CONFIGURATION OR BUS- STRINGING PARAMETERS.			
EFFECTS/RATIONALE: LOSS OF MEMORY IN BUS ASSIGNMENT TABLE (NBAT) COULD RESULT IN A GPC ATTEMPTING TO COMMAND A DATA BUS COMMANDED BY ANOTHER GPC. BOTH EXAMINE THEIR RESPECTIVE NBAT AND ASSUME NO ERROR CONDITION, AND CONTINUE TRANSMISSION ON THAT SAME BUS. THIS WOULD CAUSE ALL DATA ON THAT BUS TO BE ERRONEOUS. FURTHERMORE, IDLE BUS IS CREATED AND 2 COMMAND PATHS ARE LOST. POSSIBLE TO OUTVOTE GOOD			

REFERENCES: JSC 18820, JSC 11174, JSC 12770

COMMANDS: LOSS OF VEHICLE/LIFE.

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 209	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3		
ITEM: CPU POWER SWITCH FAILURE MODE: FAILS CLOSED			
LEAD ANALYST: T. B. CRIBBS SU	BSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) CENTRAL PROCESSING UNIT (CPU) 4) CPU POWER SWITCH 5) 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	ABORTHDW/FUNCRTLS:3/3TAL:3/3AOA:3/3ATO:3/3		
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: PANEL 06 PART NUMBER:			
CAUSES: CPU POWER SWITCH IS STUCK IN THE "ON" POSITION DUE TO CONTAMINATION			
EFFECTS/RATIONALE: FLIGHT RULES DICTATE THAT THE CREW SHOULD POWER OFF ANY GPC WHICH HAS RECURRING ERRORS DURING DYNAMIC FLIGHT PHASES, AS SOON AS POSSIBLE TO AVOID ERRONEOUS OUTPUTS BEING SENT TO ACTUATORS. IF THE CPU POWER SWITCH WERE STUCK IN THE "ON" POSITION AND ANOTHER GPC BEGAN SENDING ERRONEOUS DATA, THE ACTUATORS COULD NOT VOTE OUT THE ERRONEOUS COMMANDS AND THE CREW WOULD NEED TO TAKE MANUAL CONTROL.			
REFERENCES: USC 18820, USC 111/4, C			

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 210	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: GPC MODE SWITCH FAILURE MODE: FAILS CLOSED			
LEAD ANALYST: T. B. CRIBBS SU	JBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) CENTRAL PROCESSING UNIT (CPU) 4) GPC MODE SWITCH 5) 6) 7) 8) 9)			
CRITICAI	LITIES		
FLIGHT PHASE HDW/FUNC	LITIES ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R	TAL: $3/1R$		
ONORBIT: 3/2R	AOA: 3/1R		
ONORBIT: 3/2R DEORBIT: 3/1R	ATO: 3/1R		
LANDING/SAFING: 3/1R			
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: PANEL 06 PART NUMBER:			
CAUSES: CPU MODE SWITCH IS STUCK IN THE "HALT" OR "STANDBY" POSITION DUE TO CONTAMINATION			
EFFECTS/RATIONALE: IF THE MODE SWITCH FOR A GPC WERE STUCK IN A NON-RUN POSITION THE GPC WOULD IN EFFECT BE DISABLED, SIMILAR TO FAILING TO HALT. THE REMAINING GPC'S WOULD IGNORE THIS GPC, AND THE GPC WOULD NOT BE AVAILABLE AS A BACKUP OR REDUNDANT MEMBER. IF ALL GPC'S WERE STUCK IN THE STANDBY MODE, THE CREW COULD NOT PERFORM CRITICAL FLIGHT CONTROL FUNCTIONS.			
REFERENCES: JSC 18820, JSC 11174,	JSC 12770		

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 211	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: GPC OUTPUT SWITCH FAILURE MODE: FAILS CLOSED	La companya da serie da s		
LEAD ANALYST: T. B. CRIBBS	SUBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (G 3) CENTRAL PROCESSING UNIT (CP 4) GPC OUTPUT SWITCH 5) 6)			
7) 8) 9)			
CRITI	CALITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/3 DEORBIT: 3/1R	ABORT HDW/FUNC		
LIETOFE: 3/3	RTLS: 3/1R TAL: 3/1R		
ONORBIT: 3/3	AOA: $3/1R$		
DEORBIT: 3/1R LANDING/SAFING: 3/1R	ATO: 3/1R		
REDUNDANCY SCREENS: A [1]	B[P] C[P]		
LOCATION: PANEL 06 PART NUMBER:			
CAUSES: CPU OUTPUT SWITCH IS STUCK IN THE "TERMINATE" OR "BACKUP" POSITION DUE TO CONTAMINATION			
EFFECTS/RATIONALE: IF THE OUTPUT SWITCH WERE STUCK IN THE "TERMINATE" POSITION, THIS WOULD HAVE THE SAME EFFECT OF DISABLING THE GPC'S OUTPUT; ALL SWITCHES IN THIS POSITION WOULD CAUSE LOSS OF VEHICLE CONTROL. IF THE SWITCH WERE STUCK IN THE "BACKUP" POSITION THIS GPC WOULD ONLY BE AVAILABLE AS BFS. IF ALL SWITCHES IN "BACKUP" GPC 5 WOULD BE BACKUP WHEN ENGAGED.			
REFERENCES: JSC 18820, JSC 11174	4, JSC 12770		

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 3/3 FLIGHT: SUBSYSTEM: DPS 3/3 ABORT: MDAC ID: 212 ITEM: IPL SOURCE SWITCH FAILURE MODE: FAILS OPEN LEAD ANALYST: T. B. CRIBBS SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) CENTRAL PROCESSING UNIT (CPU) MMU INITIAL PROGRAM LOAD (IPL) SOURCE SWITCH 4) 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC FLIGHT PHASE HDW/FUNC ABORT RTLS: 3/3 PRELAUNCH: 3/3 3/3 LIFTOFF: 3/3 TAL: 3/3 AOA: 3/3 ONORBIT: ATO: 3/3 DEORBIT: 3/3 LANDING/SAFING: 3/3 REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: PANEL 06 PART NUMBER: CAUSES: IPL SELECTOR SWITCH IS SHORTED OR POWER SOURCE IS LOST DUE TO CONTAMINATION EFFECTS/RATIONALE: IPL SOURCE SWITCH IS USED AT PRE-LAUNCH TO INITIALIZE GPC'S. THIS FAILURE COULD CAUSE LOSS OF A MISSION OPPORTUNITY DUE TO LAUNCH DELAY. DURING FLIGHT THE GPC'S ARE NOT TYPICALLY RE-IPL'ED, EVEN THOUGH THE MMU IS USED TO RETRIEVE NEW MEMORY OVERLAYS (AS OPPOSED TO THE IPL LOADING THE ENTIRE SYSTEM SOFTWARE, INCLUDING MCDS INITIALIZATION). REFERENCES: JSC 18820, JSC 11174, JSC 12770

DATE: 10/03/86 H SUBSYSTEM: DPS MDAC ID: 213	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: GPC POWER SWITCH FAILURE MODE: FAILS OPEN			
LEAD ANALYST: T. B. CRIBBS SUBS	YS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) GENERAL PURPOSE COMPUTER (GPC) 3) CENTRAL PROCESSING UNIT (CPU) 4) GPC POWER SWITCH 5) 6) 7) 8) 9)	n an an Anna Anna Anna Anna Anna Anna A		
CRITICALIT FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/3 LIFTOFF: 3/1R ONORBIT: 3/2R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
REDUNDANCY SCREENS: A [1] B	[P] C[P]		
LOCATION: PANEL 06 PART NUMBER:			
CAUSES: CPU POWER SWITCH IS STUCK IN "OFF" POSITION, OR GPC POWER IS LOST			
EFFECTS/RATIONALE: IF THE GPC POWER SWITCH WERE STUCK IN THE "OFF" POSITION, THE GPC COULD NOT FUNCTION, SAME AS CPU LOSS OF OUTPUT.			
REFERENCES: JSC 18820, JSC 11174, JS	C 12770		

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 300	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: KEYBOARD SWITCH FAILURE MODE: OPEN/CLOSED	
LEAD ANALYST: H J LOWERY	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY 3) KEYBOARD 4) SWITCH 5) 6) 7) 8) 9)	SYSTEM (MCDS)
CRIT	ICALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: UPPER CREW AREA PART NUMBER:	
CAUSES: MECHANICAL FRACTURE/ C	ONTAMINATION/ DEBRIS
NOT BE ACCESSIBLE DURING PERIOD	CES. IE. 1. LIFT-OFF THROUGH MAIN 8 MIN 40 SEC; 2. ENTRY THROUGH
REFERENCES:	

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 301	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: X/Y DEFLECTION AMP FAILURE MODE: NO OUTPUT/ERRONEOU	LIFIERS S/ERRATIC OUTPUT		
LEAD ANALYST: H J LOWERY	SUBSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYS 3) DISPLAY UNIT 4) X/Y DEFLECTION AMPLIFIERS 5) 6) 7) 8) 9)	STEM (MCDS)		
	ALITIES		
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/2RLIFTOFF:3/1RONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/1R	ABORTHDW/FUNCRTLS:3/1RTAL:3/1RAOA:3/1RATO:3/1R		
REDUNDANCY SCREENS: A [1]	B[P] C[P] C[P]		
LOCATION: UPPER CREW AREA PART NUMBER:			
CAUSES: TEMPERATURE STRESS/ CONTA	MINATION/ DEBRIS		
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING. REFERENCES:			

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DATE: 10/03/86 H SUBSYSTEM: DPS MDAC ID: 302	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: VIDEO AMPLIFIER FAILURE MODE: NO OUTPUT/ERRONEOUS/ER	RATIC OUTPUT
LEAD ANALYST: H J LOWERY SUBS	YS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYSTEM 3) DISPLAY UNIT 4) VIDEO AMPLIFIER 5) 6) 7) 8) 9)	(MCDS)
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1] B	[P] C[P]
LOCATION: UPPER CREW AREA PART NUMBER:	
CAUSES: TEMPERATURE STRESS/ CONTAMIN	ATION/ DEBRIS
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. REDUN ACCESSIBLE DURING PERIODS OF ANTICIPA ACCELERATION/DEACCELERATION FORCES. ENGINE CUT-OFF - APPROXIMATELY 8 MIN SAFEING -APPROXIMATELY 400,000FT (TD	TED HIGH IE. 1. LIFT-OFF THROUGH MAIN 40 SEC; 2. ENTRY THROUGH
REFERENCES:	

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	10/0 M: DPS 303		HIGHEST	CRITICALITY FLIGHT: ABORT:	
		THODE-RAY TUBE OUTPUT/ERRONEC	US/ERRATIC O	UTPUT	
LEAD ANA	LYST: H J	LOWERY	SUBSYS LEAD	: B. ROBB	
1) DPS 2) MUL 3) DIS		N CRT DISPLAY S	YSTEM (MCDS)		
		CRITI	CALITIES		
FLIG P L O D L	CHT PHASE CRELAUNCH: DIFTOFF: NORBIT: DEORBIT: ANDING/SA	HDW/FUNC 3/2R 3/1R 3/1R 3/1R 3/1R FING: 3/1R	ABORT RTL TAL AOA ATO	HDW/FUN S: 3/1R : 3/1R : 3/1R : 3/1R : 3/1R	C
REDUNDAN	CY SCREEN	5: A[1]	B [P]	С[Р]	
LOCATION PART NUM		ER CREW AREA			
		EMPERATURE STRE INATION/ DEBRIS		AL FRACTURE/	
LOSS OF ACCESSIB ACCELERA ENGINE C	MONITORING LE DURING TION/DEAC UT-OFF - 7 -APPROXIM	G CAPABILITY. PERIODS OF ANT CELERATION FORC APPROXIMATELY 8 ATELY 400,000FT	REDUNDANT HA ICIPATED HIG ES. IE. 1. MIN 40 SEC;	RDWARE WOULD H LIFT-OFF THR(2. ENTRY THI	OUGH MAIN ROUGH

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 304	HIGHEST CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R		
ITEM: HI AND LOW VOLTAGE I FAILURE MODE: NO OUTPUT/ERRONEOUS/	POWER SUPPLIES /ERRATIC OUTPUT			
LEAD ANALYST: H J LOWERY SU	JBSYS LEAD: B. ROBB			
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYST 3) DISPLAY UNIT 4) HIGH AND LOW (+/-5, 15, 28 & 8 5) 6) 7) 8) 9)		SUPPLIES		
CRITICAL	LITIES			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FU RTLS: 3/1F TAL: 3/1F AOA: 3/1F ATO: 3/1F			
REDUNDANCY SCREENS: A [1]	В[Р] С[Р]			
LOCATION: UPPER CREW AREA PART NUMBER:				
CAUSES: MECHANICAL FRACTURES/ CONTAMINATION/ DEBRIS				
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING. REFERENCES:				

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DATE: 10/0 SUBSYSTEM: DPS MDAC ID: 305	3/86		ITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM: RF FAILURE MODE: OF	C EN/CLOSED/PREMAT	TURE OPERATION	••	- 7
LEAD ANALYST: H J	LOWERY	SUBSYS LEAD:	B. ROBB	
BREAKDOWN HIERARC 1) DPS 2) MULTIFUNCTIC 3) DISPLAY UNIT 4) RPC 5) 6) 7) 8) 9)	N CRT DISPLAY SY	STEM (MCDS)		
	CRITIC	CALITIES		
FLIGHT PHASE PRELAUNCH: LIFTOFF: ONORBIT: DEORBIT: LANDING/SA	3/1R 3/1R 3/1R	ABORT RTLS: TAL: AOA: ATO:	3/1R 3/1R	ź
REDUNDANCY SCREEN	S: A [1]	B [P]	С[Р]	n na na se
LOCATION: UPP PART NUMBER:	ER CREA AREA			:
CAUSES: MECHANICAL FRACTURE/ CONTAMINATION/ DEBRIS				
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING. REFERENCES:				

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 306	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: MEMORY FAILURE MODE: NO OUTPUT/ERRONEOU	S/ERRATIC OUTPUT
LEAD ANALYST: H J LOWERY	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SY 3) DEU 4) MEMORY 5) 6) 7) 8) 9)	STEM (MCDS)
CRITIC	ALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: UPPER CREW AREA PART NUMBER:	
CAUSES: CONTAMINATION/ DEBRIS	
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. R ACCESSIBLE DURING PERIODS OF ANTI ACCELERATION/DEACCELERATION FORCE ENGINE CUT-OFF - APPROXIMATELY 8 SAFEING -APPROXIMATELY 400,000FT REFERENCES:	CIPATED HIGH S. IE. 1. LIFT-OFF THROUGH MAIN MIN 40 SEC; 2. ENTRY THROUGH

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 307	HIGHEST C	RITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM: KEYBOARD ADAPTER FAILURE MODE: NO OUTPUT/ERRONEOUS	/ERRATIC OU	TPUT	· • · ·
LEAD ANALYST: H J LOWERY S	UBSYS LEAD:	B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYS 3) DEU 4) KEYBOARD ADAPTER 5) 6) 7) 8) 9)	TEM (MCDS)		
CRITICA	LITIES		
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/2RLIFTOFF:3/1RONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/1R	ABORT RTLS TAL: AOA: ATO:	3/1R 3/1R	2
REDUNDANCY SCREENS: A [1]	B [P]	C [P]	
LOCATION: UPPER CREW AREA PART NUMBER:			

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CAUSES: CONTAMINATION/ DEBRIS

EFFECTS/RATIONALE:

LOSS OF INPUTTING COMMAND CAPABILITY. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING.

REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 308	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: SYMBOL GENERATOR FAILURE MODE: NO OUTPUT/ERRONEOUS/	ERRATIC OUTPUT		
LEAD ANALYST: H J LOWERY SU	BSYS LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYST 3) DEU 4) SYMBOL GENERATOR 5) 6) 7) 8) 9)	EM (MCDS)		
CRITICAL	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
REDUNDANCY SCREENS: A [1]	B [P] C [P]		
LOCATION: UPPER CREW AREA PART NUMBER:			
CAUSES: CONTAMINATION/ DEBRIS			
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING. REFERENCES:			

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 309	HIGHEST CRITICALITY H FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM: MIA FAILURE MODE: NO OUTPUT/ERRONE	OUS/ERRATIC OUTPUT	
LEAD ANALYST: H J LOWERY	SUBSYS LEAD: B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY 3) DEU 4) MIA 5) 6) 7) 8) 9)	SYSTEM (MCDS)	
	ICALITIES	
FLIGHT PHASEHDW/FUNCPRELAUNCH:3/2RLIFTOFF:3/1RONORBIT:3/1RDEORBIT:3/1RLANDING/SAFING:3/1R	ABORTHDW/FUNCRTLS:3/1RTAL:3/1RAOA:3/1RATO:3/1R	
REDUNDANCY SCREENS: A [1]	B[P] C[P]	
LOCATION: UPPER CREW AREA PART NUMBER:		

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CAUSES: CONTAMINATION/ DEBRIS

EFFECTS/RATIONALE:

LOSS OF MONITORING CAPABILITY. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING.

REFERENCES:

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 310	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: CONTROL LOGIC FAILURE MODE: NO OUTPUT/ERRONEOUS,	/ERRATIC OUTPUT
LEAD ANALYST: H J LOWERY ST	JBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYS ⁴ 3) DEU 4) CONTROL LOGIC 5) 6) 7) 8) 9)	FEM (MCDS)
CRITICA	LITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1]	B[P] C[P]
LOCATION: UPPER CREW AREA PART NUMBER:	-
CAUSES: CONTAMINATION/ DEBRIS	
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. REL ACCESSIBLE DURING PERIODS OF ANTIC ACCELERATION/DEACCELERATION FORCES ENGINE CUT-OFF - APPROXIMATELY 8 M SAFEING -APPROXIMATELY 400,000FT (IPATED HIGH . IE. 1. LIFT-OFF THROUGH MAIN IN 40 SEC; 2. ENTRY THROUGH

REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 311		ITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM: POWER SUPPLIES FAILURE MODE: NO OUTPUT/ERRONEOUS/E	RRATIC OUT	PUT	
LEAD ANALYST: H J LOWERY SUB	SYS LEAD: 1	B. ROBB	
<pre>BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYSTE 3) DEU 4) POWER SUPPLIES (+/-5, 12 & 15 V 5) 6) 7) 8) 9)</pre>			;
CRITICALI	TIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT RTLS: TAL: AOA: ATO:	3/1R 3/1R	3
REDUNDANCY SCREENS: A [1] B	[P]	C [P]	
LOCATION: UPPER CREW AREA PART NUMBER:	•		
CAUSES: CONTAMINATION/ DEBRIS			
EFFECTS/RATIONALE:			

LOSS OF MONITORING CAPABILITY. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING.

REFERENCES:

SUBSYSTEM: DPS MDAC ID: 312	HEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: RPC FAILURE MODE: OPEN/CLOSED/PREMATURE OPE	TRATION
LEAD ANALYST: H J LOWERY SUBSYS	LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYSTEM (M 3) DEU 4) RPC 5) 6) 7) 8) 9)	1CDS)
CRITICALITIES	3
FLIGHT PHASE HDW/FUNC AF PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	BORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1] B [B	?] C[P]
LOCATION: UPPER CREW AREA PART NUMBER:	
CAUSES: TEMPERATURE STRESS/ MECHANICAL DEBRIS	FRACTURE/ CONTAMINATION/
EFFECTS/RATIONALE: LOSS OF MONITORING CAPABILITY. REDUNDAN ACCESSIBLE DURING PERIODS OF ANTICIPATED ACCELERATION/DEACCELERATION FORCES. IE. ENGINE CUT-OFF - APPROXIMATELY 8 MIN 40 SAFEING -APPROXIMATELY 400,000FT (TD -40 REFERENCES:	D HIGH . 1. LIFT-OFF THROUGH MAIN SEC; 2. ENTRY THROUGH

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 313	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/3 ABORT: 3/3
ITEM: LOAD SWITCH FAILURE MODE: OPEN/CLOSED/PREMATURE	OPERATION
LEAD ANALYST: H J LOWERY SUB	SYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYSTEM 3) DEU 4) LOAD SWITCH 5) 6) 7) 8) 9)	1 (MCDS)
CRITICALI	
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 [1] B	[P] C[P]
LOCATION: UPPER CREW AREA PART NUMBER:	
CAUSES: MECHANICAL FRACTURE/ CONTAM	INATION/ DEBRIS
EFFECTS/RATIONALE: DEUS ARE NOT NORMALLY RELOADED DURING NEEDED.	A MISSION. SWITCH IS NOT

REFERENCES:

DATE: 10/03/86 HI SUBSYSTEM: DPS MDAC ID: 314	GHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: FUNCTION SWITCH FAILURE MODE: OPEN/CLOSED/PREMATURE O	PERATION
LEAD ANALYST: H J LOWERY SUBSY	S LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SYSTEM 3) DEU 4) FUNCTION SWITCH 5) 6) 7) 8) 9)	(MCDS)
CRITICALITI	ES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING/SAFING: 3/1R	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R
REDUNDANCY SCREENS: A [1] B [P] C[P]
LOCATION: UPPER CREW AREA PART NUMBER:	
CAUSES: MECHANICAL FRACTURE/ CONTAMIN	ATION/ DEBRIS
EFFECTS/RATIONALE: IMPROPER MAJOR FUNCTION IDENTIFICATION	•

REFERENCES:

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 315	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R
ITEM: DATA BUS COUPLER (FAILURE MODE: OPEN/SHORT	DBC)
LEAD ANALYST: H J LOWERY	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY SY: 3) DBC 4) 5) 6) 7) 8) 9)	STEM (MCDS)
CRITIC	ALITIES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: 3/1R DEORBIT: 3/1R LANDING (CARING: 2/1P	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R
PRELAUNCH: 3/2R	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 [1]	B[P] C[P]
LOCATION: ALL AV BAYS PART NUMBER:	
CAUSES: MECHANICAL FRACTURE/ CON	FAMINATION/ DEBRIS
EFFECTS/RATIONALE: LOSS OF DATA BUS. REDUNDANT HARDW	WARE WOULD NOT BE ACCESSIBLE

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LOSS OF DATA BUS. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION FORCES. IE. 1. LIFT-OFF THROUGH MAIN ENGINE CUT-OFF -APPROXIMATELY 8 MIN 40 SEC; 2. ENTRY THROUGH SAFEING -APPROXIMATELY 400,000FT (TD -40 MIN) THROUGH SAFEING.

REFERENCES:

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 316	HIGHEST CRITICALITY HDW/FUNG FLIGHT: 3/2R ABORT: /NA	С
ITEM: DBIA FAILURE MODE: OPEN/SHORT/ERRON	EOUS/ERRATIC OUTPUT	
LEAD ANALYST: H J LOWERY	SUBSYS LEAD: B. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MULTIFUNCTION CRT DISPLAY 3) DBIA 4) 5) 6) 7) 8) 9)	SYSTEM (MCDS)	
	ICALITIES	
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/2R ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: /NA	RTLS: 3/2R TAL: /NA	
REDUNDANCY SCREENS: A [1]	B[NA] C[P]	
LOCATION: AV BAY 5 PART NUMBER:		
CAUSES: MECHANICAL FRACTURE/ C EFFECTS/RATIONALE: LOSS OF ONE COMMAND/DATA PATH.	ONTAMINATION/ DEBRIS	

REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 400	HIGHEST	CRITICALITY HDW/FU FLIGHT: 3/2R ABORT: 3/2R	
ITEM: TAPE TRANSPOR FAILURE MODE: LOSS OF OUTPU			
LEAD ANALYST: K. PIETZ	SUBSYS LEAD: B	. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) TAPE TRANSPORT MECHANIS 4) 5) 6) 7) 8) 9)	M		
	RITICALITIES		
FLIGHT PHASE HDW/FU PRELAUNCH: 3/2R LIFTOFF: 3/2R ONORBIT: 3/2R DEORBIT: /NA LANDING/SAFING: /NA	NC ABORT RT TA AO. AT	$\begin{array}{ccc} LS: & /NA \\ L: & 3/2R \\ A: & 3/2R \end{array}$	
REDUNDANCY SCREENS: A [2] B[P]	C [P]	
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005			

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CAUSES: WORN TAPE OR FOREIGN MATTER ON TAPE, MOTOR FAILURE (WORN BRUSHES, ETC.), WORN HEADS, FAILURE OF NEGATOR SPRING CAUSING TAPE SLIPPAGE DUE TO INCORRECT TENSION.

EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.

REFERENCES:

C-68

DATE: 10/03/86 HI SUBSYSTEM: DPS MDAC ID: 401	IGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/2R
ITEM: TAPE TRANSPORT MECHANIS FAILURE MODE: ERRONEOUS OUTPUT	SM
LEAD ANALYST: K. PIETZ SUBSYS L	EAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) TAPE TRANSPORT MECHANISM 4) 5) 6) 7) 8) 9)	·
CRITICALIT	IES
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/2R ONORBIT: 3/2R DEORBIT: /NA LANDING/SAFING: /NA	ABORT HDW/FUNC RTLS: /NA TAL: 3/2R AOA: 3/2R ATO: 3/2R
REDUNDANCY SCREENS: A [2] B	[P] C[P]
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005	
CAUSES: WORN TAPE OR FOREIGN MATTER (TO INCORRECT TENSION.	ON TAPE, TAPE SLIPPAGE DUE
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWAN HOWEVER, OPS 3 CAN BE UPLINKED OR BFS	RE CANNOT BE LOADED. ENGAGED FOR ENTRY.
REFERENCES:	

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DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 402 ABORT: 3/2R
ITEM: READ ELECTRONICS FAILURE MODE: LOSS OF OUTPUT
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) READ ELECTRONICS 4) 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:/NALIFTOFF:3/2RTAL:3/2RONORBIT:3/2RAOA:3/2RDEORBIT:/NAATO:3/2RLANDING/SAFING:/NAATO:3/2R
REDUNDANCY SCREENS: A [2] B [P] C [P]
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005
CAUSES: ELECTRICAL FAILURE
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.

REFERENCES:

DATE:10/03/86HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:DPSFLIGHT:3/2RMDAC ID:403ABORT:3/2R
ITEM: READ ELECTRONICS FAILURE MODE: ERRONEOUS OUTPUT
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) READ ELECTRONICS 4) 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/2R RTLS: /NA LIFTOFF: 3/2R TAL: 3/2R ONORBIT: 3/2R AOA: 3/2R DEORBIT: /NA ATO: 3/2R LANDING/SAFING: /NA
REDUNDANCY SCREENS: A [2] B [P] C [P]
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005
CAUSES: ELECTRICAL FAILURE
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.

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DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 404 ABORT: 3/2R
ITEM: MIA FAILURE MODE: LOSS OF OUTPUT
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) MIA 4) 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:/NALIFTOFF:3/2RTAL:3/2RONORBIT:3/2RAOA:3/2RDEORBIT:/NAATO:3/2RLANDING/SAFING:/NAATO:3/2R
REDUNDANCY SCREENS: A [1] B [P] C [P]
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005
CAUSES: ELECTRICAL FAILURE
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.

REFERENCES:

DATE:10/03/86HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:DPSFLIGHT:3/2RMDAC ID:405ABORT:3/2R
ITEM: MIA FAILURE MODE: ERRONEOUS OUTPUT
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) MIA 4) 5) 6) 7) 8) 9)
CRITICALITIES
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:/NALIFTOFF:3/2RTAL:3/2RONORBIT:3/2RAOA:3/2RDEORBIT:/NAATO:3/2RLANDING/SAFING:/NAATO:3/2R
REDUNDANCY SCREENS: A [1] B [P] C [P]
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005
CAUSES: ELECTRICAL FAILURE
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.
REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 406	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/2R ABORT: 3/2R
ITEM: WRITE ELECTRON FAILURE MODE: LOSS OF OUTPUT	ICS
LEAD ANALYST: K. PIETZ	SUBSYS LEAD: B. ROBB
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) WRITE ELECTRONICS 4) 5) 6) 7) 8) 9)	
CRI	ITICALITIES
FLIGHT PHASE HDW/FUNG	ABORT HDW/FUNC
PRELAUNCH: 3/2R	RTLS: /NA
LIFTOFF: 3/2R	TAL: $3/2R$
ONORBIT: 3/2R DEORBIT: /NA	AOA: 3/2R
DEORBIT: /NA	ATO: 3/2R
LANDING/SAFING: /NA	
REDUNDANCY SCREENS: A [2]	B[P] C[P]
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005	_
CAUSES: ELECTRICAL FAILURE	
EFFECTS/RATIONALE:	IS WEDE LOST THE MISSION COULD BE

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IF THE ABILITY TO WRITE TO MMUS WERE LOST, THE MISSION COULD BE TERMINATED EARLY. NO DANGER TO CREW OR VEHICLE.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 407 ABORT: 3/2R			
ITEM: RPC FAILURE MODE: FAILED OPEN			
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB			
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) POWER SUPPLY 4) RPC 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:/NALIFTOFF:3/2RTAL:3/2RONORBIT:3/2RAOA:3/2RDEORBIT:/NAATO:3/2RLANDING/SAFING:/NAATO:3/2R			
REDUNDANCY SCREENS: A [1] B [P] C [P]			
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005			
CAUSES: BROKEN CONTACT			
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.			

REFERENCES:

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 408	HIGHEST	CRITICALITY FLIGHT: ABORT:	3/2R
ITEM: SWITCH FAILURE MODE: FAILED OPEN		· _	
LEAD ANALYST: K. PIETZ SUBSYS	LEAD: B	. ROBB	
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) POWER SUPPLY 4) SWITCH 5) 6) 7) 8) 9)			
CRITICAL			
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/2R ONORBIT: 3/2R DEORBIT: /NA LANDING/SAFING: /NA	RTI TAI AOI	HDW/FUN LS: /NA L: 3/2R A: 3/2R D: 3/2R	IC
REDUNDANCY SCREENS: A [1]	B [P]	C[P]	
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005			
CAUSES: BROKEN CONTACT		2.9% 	7.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 - 1.00 -
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFT HOWEVER, OPS 3 CAN BE UPLINKED OR BI	WARE CANN FS ENGAGI	NOT BE LOADED ED FOR ENTRY.).

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 409 ABORT: 3/3			
ITEM: SWITCH FAILURE MODE: FAILED CLOSED (ON)			
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB			
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) POWER SUPPLY 4) SWITCH 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC			
PRELAUNCH:3/2RRTLS:/NALIFTOFF:3/3TAL:3/3			
ONORBIT: 3/3 AOA: 3/3			
DEORBIT: /NA ATO: 3/3 LANDING/SAFING: /NA			
REDUNDANCY SCREENS: A [] B [P] C [P]			
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005			
CAUSES: STRAY PARTICLE			
EFFECTS/RATIONALE: NONE			
REFERENCES:			

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DATE:10/03/86HIGHEST CRITICALITYHDW/FUNCSUBSYSTEM:DPSFLIGHT:3/2RMDAC ID:410ABORT:3/2R			
ITEM: CONTROL LOGIC FAILURE MODE: LOSS OF OUTPUT			
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB			
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) CONTROL LOGIC 4) 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC			
DETAINON. 2/2D DETC. /NA			
PRELAUNCH: 3/2R RTLS: /NA			
LIFTOFF: 3/2R TAL: 3/2R			
LIFTOFF: 3/2R TAL: 3/2R ONORBIT: 3/2R AOA: 3/2R DEORBIT: /NA ATO: 3/2R			
DEORBIT: /NA ATO: 3/2R			
LANDING/SAFING: /NA			
REDUNDANCY SCREENS: A [2] B [P] C [P]			
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005			
CAUSES: ELECTRICAL FAILURE			
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 OR 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.			

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DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 411 ABORT: 3/2R			
ITEM: CONTROL LOGIC FAILURE MODE: ERRONEOUS OUTPUT			
LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB			
BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) CONTROL LOGIC 4) 5) 6) 7) 8) 9)			
CRITICALITIES			
FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:/NA			
LIFTOFF: 3/2R RTLS: /NA LIFTOFF: 3/2R TAL: 3/2R			
ONORBIT: $3/2R$ AOA: $3/2R$			
DEORBIT: /NA ATO: 3/2R			
LANDING/SAFING: /NA			
REDUNDANCY SCREENS: A [2] B [P] C [P]			
LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005			
CAUSES: ELECTRICAL FAILURE			
EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 OR 3 SOFTWARE CANNOT BE LOADED.			

HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY.

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REFERENCES:

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HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 FLIGHT: 3/2R SUBSYSTEM: DPS ABORT: 3/2R MDAC ID: 412 ITEM: POWER SUPPLY FAILURE MODE: FAILS OUT OF TOLERANCE OR INTERRUPT LEAD ANALYST: K. PIETZ SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: 1) DPS 2) MASS MEMORY UNITS (MMU) 3) POWER SUPPLY 4) 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE RTLS: 3/2R /NA PRELAUNCH: 3/2R 3/2R TAL: LIFTOFF: AOA: 3/2R ONORBIT: 3/2R ATO: /NA 3/2RDEORBIT: /NA LANDING/SAFING: <u> -</u> -REDUNDANCY SCREENS: A [2] B [P] C [P] LOCATION: AV BAY 1,2 PART NUMBER: MC 615-0005 CAUSES: ELECTRICAL FAILURE EFFECTS/RATIONALE: IF BOTH MMUS FAIL, OPS 2 AND 3 SOFTWARE CANNOT BE LOADED. HOWEVER, OPS 3 CAN BE UPLINKED OR BFS ENGAGED FOR ENTRY. NEITHER

REFERENCES:

OF THESE OPTIONS REQUIRE THE USE OF MMUS.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 SUBSYSTEM: DPS FLIGHT: 3/1R 3/1R ABORT: MDAC ID: 501 ITEM: CIA FAILURE MODE: LOSS OF OUTPUT TO MAIN ENGINE ON ONE CHANNEL SUBSYS LEAD: B. ROBB LEAD ANALYST: B. ROBB BREAKDOWN HIERARCHY: DPS 1) ENGINE INTERFACE UNIT (EIU) 2) CONTROLLER INTERFACE ADAPTER 3) 4) 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT FLIGHT PHASE HDW/FUNC RTLS: 3/1R PRELAUNCH: 3/2R 3/1R TAL: LIFTOFF: 3/1R 3/1R AOA: ONORBIT: /NA ATO: 3/1R DEORBIT: /NA LANDING/SAFING: /NA REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 4,5,6 PART NUMBER: CAUSES: CONTROLLER INTERFACE ADAPTER FAILS EFFECTS/RATIONALE: LOSS OF THROTTLE COMMANDS, SHUTDOWN COMMANDS, LIMIT INHIBIT/ENABLE COMMANDS, GPC SHUTDOWN COMMANDS, AND MPS DUMP COMMANDS. LOSS OF ONE OF THREE COMMAND PATHS WILL BE VOTED INVALID. NO EFFECT ON ENGINE OPERATIONS. **REFERENCES:**

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 502	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: MIA FAILURE MODE: LOSS OF OUTPUT TO MAI	N ENGINE ON ONE CHANNEL		
LEAD ANALYST: B. ROBB SUBSYS L	EAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) ENGINE INTERFACE UNIT (EIU) 3) MULTIPLEXER INTERFACE ADAPTER 4) 5) 6) 7) 8) 9)			
CRITICALI	TIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: /NA	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
REDUNDANCY SCREENS: A [1] B	[P] C[P]		
LOCATION: AV BAY 4,5,6 PART NUMBER:			
CAUSES: MULTIPLEXER INTERFACE ADAPTER FAILS			
EFFECTS/RATIONALE: LOSS OF THROTTLE COMMANDS, SHUTDOWN COMMANDS, LIMIT INHIBIT/ENABLE COMMANDS, GPC SHUTDOWN COMMANDS, AND MPS DUMP COMMANDS. LOSS OF ONE OF THREE COMMAND PATHS WILL BE VOTED INVALID. NO EFFECT ON ENGINE OPERATIONS.			

REFERENCES:

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ITEM: POWER CONTROL SWITCH FAILURE MODE: LOSS OF OUTPUT TO MAIN ENGINE ON ANY OF THREE COMMAND CHANNELS LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY:		
BREAKDOWN HIERARCHY:		
BREAKDOWN HIERARCHY: 1) DPS 2) ENGINE INTERFACE UNIT (EIU) 3) POWER CONTROL SWITCH 4) 5) 6) 7) 8) 9)		
CRITICALITIES		
FLIGHT PHASE HDW/FUNC ABORT HDW/FUNC PRELAUNCH: 3/2R RTLS: 3/1R LIFTOFF: 3/1R TAL: 3/1R ONORBIT: /NA AOA: 3/1R DEORBIT: /NA ATO: 3/1R LANDING/SAFING: /NA		
REDUNDANCY SCREENS: A [1] B [P] C [P]		
LOCATION: AV BAY 4,5,6 PART NUMBER:		
CAUSES: EIU POWER CONTROL SWITCH FAILS OPEN		
EFFECTS/RATIONALE: LOSS OF ALL COMMANDS AND STATUS OF THE ENGINE FOR THIS FAILURE MODE THE LOSS OF THE ENTIRE EIU WILL RESULT IN ENGINE SHUTDOWN BY CREW BY SWITCHING AC POWER TO THE ENGINE TO OFF POSITION. REFERENCES:		

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DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 504	HIGHEST (CRITICALITY FLIGHT: ABORT:	HDW/FUNC 3/1R 3/1R
ITEM: INTERNAL POWER SUPPLIES FAILURE MODE: LOSS OF OUTPUT TO MAIN ENGINE ON ANY OF THREE COMMAND CHANNELS			
LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB			
BREAKDOWN HIERARCHY: 1) DPS 2) ENGINE INTERFACE UNIT (EIU) 3) INTERNAL POWER SUPPLIES 4) 5) 6) 7) 8) 9)			
CRITICAL	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: /NA	ABORT RTLS TAL AOA ATO	: 3/1R : 3/1R	
REDUNDANCY SCREENS: A [1]	B [P]	С[Р]	
LOCATION: AV BAY 4,5,6 PART NUMBER:			
CAUSES: INTERNAL POWER SUPPLIES FAIL			

EFFECTS/RATIONALE:

LOSS OF THROTTLE COMMANDS, SHUTDOWN COMMANDS, LIMIT INHIBIT/ENABLE COMMANDS, GPC SHUTDOWN COMMANDS, AND MPS DUMP COMMANDS. THE LOSS OF THE ENTIRE EIU WILL RESULT IN ENGINE SHUTDOWN BY CREW BY SWITCHING AC POWER TO THE ENGINE TO OFF POSITION.

DATE: 10/03/86 SUBSYSTEM: DPS MDAC ID: 505	HIGHEST CRITICALITY HDW/FUNC FLIGHT: 3/1R ABORT: 3/1R		
ITEM: CONTROLLER INTERFACE FAILURE MODE: LOSS OF OUTPUT TO ONE ENGINES.	ADAPTER S OR THREE GPC ON STATUS OF		
LEAD ANALYST: B. ROBB SUBSYS I	LEAD: B. ROBB		
BREAKDOWN HIERARCHY: 1) DPS 2) ENGINE INTERFACE UNIT (EIU) 3) CONTROLLER INTERFACE ADAPTER 4) 5) 6) 7) 8) 9)			
CRITICALI	ITIES		
FLIGHT PHASE HDW/FUNC PRELAUNCH: 3/2R LIFTOFF: 3/1R ONORBIT: /NA DEORBIT: /NA LANDING/SAFING: /NA	ABORT HDW/FUNC RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO: 3/1R		
REDUNDANCY SCREENS: A [1] F	3 [P] C [P]		
LOCATION: AV BAY 4,5,6 PART NUMBER:			
CAUSES: CONTROLLER INTERFACE ADAPTER FAILURE			
EFFECTS/RATIONALE: NO MAIN ENGINE MONITORING BY ONE OR THREE OF FOUR GPCS. MCC CONFIRMS COMMAND PATH GOOD BY MONITORING 3-G THROTTLE CONTROL. IF ENGINE IS NOT OPERATING, THE PUSHBUTTON FOR THE ENGINE MUST BE USED TO INFORM GUIDANCE FOR PREVALVE CLOSURES. FLIGHT RULE 2-17 PRECLUDES RESTRINGING DURING POWERED ASCENT THROUGH MECO.			

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HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 SUBSYSTEM: DPS FLIGHT: 3/3 3/1R MDAC ID: 506 ABORT: ITEM: OIE FAILURE MODE: LOSS OF OUTPUT TO S-BAND, MAINTENANCE RECORDER, OR LPS T-0 UMBILICAL LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB BREAKDOWN HIERARCHY: 1) DPS 2) ENGINE INTERFACE UNIT (EIU) 3) OPERATIONAL INTERFACE ELEMENT 4) 5) 6) 7) 8) 9) CRITICALITIES FLIGHT PHASEHDW/FUNCABORTHDW/FUNCPRELAUNCH:3/2RRTLS:3/1RLIFTOFF:3/3TAL:3/1RONORBIT:/NAAOA:3/1R DEORBIT: /NA ATO: 3/1R LANDING/SAFING: /NA REDUNDANCY SCREENS: A [1] B [P] C [P] LOCATION: AV BAY 4,5,6 PART NUMBER: CAUSES: OPERATIONAL INTERFACE ELEMENT FAILURE EFFECTS/RATIONALE: NO FM DATA RECORDING, NO MCC STATUS MONITORING OF ENGINE EXCEPT IN DOWNLIST DATA FROM GPC.

APPENDIX D POTENTIAL CRITICAL ITEMS

MDAC ID	ITEM	FAILURE MODE
203	IOP	Premature Operation
208	CPU	Inadvertent Operation

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