# INDEPENDENT ORBITER ASSESSMENT

ASSESSMENT
OF THE
DATA PROCESSING SYSTEM
FMEA/CIL

**28 NOVEMBER 1986** 

### MCDONNELL DOUGLAS ASTRONAUTICS COMPANY HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

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INDEPENDENT ORBITER ASSESSMENT ASSESSMENT OF THE DATA PROCESSING SYSTEM FMEA/CIL

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# Independent Orbiter Assessment Assessment of the Data Processing System FMEA/CIL

### 1.0 EXECUTIVE SUMMARY

The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986.

The IOA effort first completed an analysis of the Data Processing System (DPS) hardware, generating draft failure modes and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. The IOA results were then compared to the NASA FMEA/CIL baseline with proposed Post 51-L updates included. A resolution of each discrepancy from the comparison is provided through additional analysis as required. This report documents the results of that comparison for the Orbiter DPS hardware.

The IOA product for the DPS analysis consisted of one hundred twenty-two failure mode "worksheets" that resulted in twenty-three potential critical items being identified. Comparison was made to the NASA baseline (as of 19 November 1986) which consisted of seventy-eight FMEAs and twenty-five CIL items. The comparison determined if there were any results which had been found by the IOA but were not in the NASA baseline. This comparison produced agreement on all but four FMEAs which caused differences in two CIL items. Figure 1 presents a comparison of the proposed Post 51-L NASA baseline, with the IOA recommended baseline, and any issues.

The issues arose due to differences between the NASA and IOA FMEA/CIL preparation instructions. NASA had used an older ground rules document which has since been superseded by the  $\underline{\text{NSTS}}$   $\underline{22206}$  used by the IOA. After comparison, there were no discrepancies found that were not already identified by NASA, and the remaining issues may be attributed to differences in ground rules.

### COUNT CORRECT AS OF 11/19/86 MULTIFUNCTION CRT NASA ISSUES NASA ISSUES DATA BUS COUPLER NASA ISSUES DATA BUS ISOLA-TION AMPLIFIERS **DISPLAY SYSTEM** IOA 10A 104 23 DPS FMEA/CIL ASSESSMENT OVERVIEW FMEA FMEA CR FMEA CIL NASA ISSUES MASS MEMORY UNIT DPS ASSESSMENT SUMMARY 10A NASA ISSUES FMEA CFL 23 % NASA ISSUES **2 2** INTERFACE UNIT FMEA ENGINE FMEA CIL. CENTRAL PROCESSING ISSUES NASA ISSUES NASA ISSUES INPUT/OUTPUT **PROCESSOR** DEMULTIPLEXER **MULTIPLEXER/** GENERAL PURPOSE COMPUTER 10A <u>8</u> FMEA FMEA CIL FMEA CIL Figure 1 - DPS FMEA/CIL ASSESSMENT

### 2.0 INTRODUCTION

### 2.1 Purpose

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

### 2.2 Scope

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

### 2.3 Analysis Approach

The independent analysis approach is a top-down analysis utilizing as-built drawings to breakdown the respective subsystem into components and low-level hardware items. Each hardware item is evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the proposed Post 51-L NASA and Prime Contractor FMEA/CIL. 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/CIL which is documented in this report.

- Step 1.0 Subsystem Familiarization
  - 1.1 Define subsystem functions
  - 1.2 Define subsystem components
  - 1.3 Define subsystem specific ground rules and assumptions
- Step 2.0 Define subsystem analysis diagram
  - 2.1 Define subsystem
  - 2.2 Define major assemblies
  - 2.3 Develop detailed subsystem representations
- Step 3.0 Failure events definition
  - 3.1 Construct matrix of failure modes
  - 3.2 Document IOA analysis results

Step 4.0 Compare IOA analysis data to NASA FMEA/CIL

- 4.1 Resolve differences
- 4.2 Review in-house
- 4.3 Document assessment issues

4.4 Forward findings to Project Manager

### 2.4 Ground Rules and Assumptions

The 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.

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### 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:

- 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.
- Five GPCs each consisting of a Central Processing Unit (CPU) and Input/Output Processor (IOP). 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, Micro-code 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 consists of three Keyboard Units (KU), four Display Units (DU) and four Display Electronics Units (DEU). Each KU has Keys, Switches and Lights. 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 contain MIAs, Read Electronics, Write Electronics, Mass Memory Control Logic, Power Supply with Switch, Tape Transport Mechanism with motor, tape and heads. The mass memory unit stores programs for loading into the GPCs and the MCDS. Reference Figure 9.
- 7. Three EIUs provide status and command capability of the main engines. Each EIU contains a 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 Unit.

### 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

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

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# DATA PROCESSING SUBSYSTEM OVERVIEW

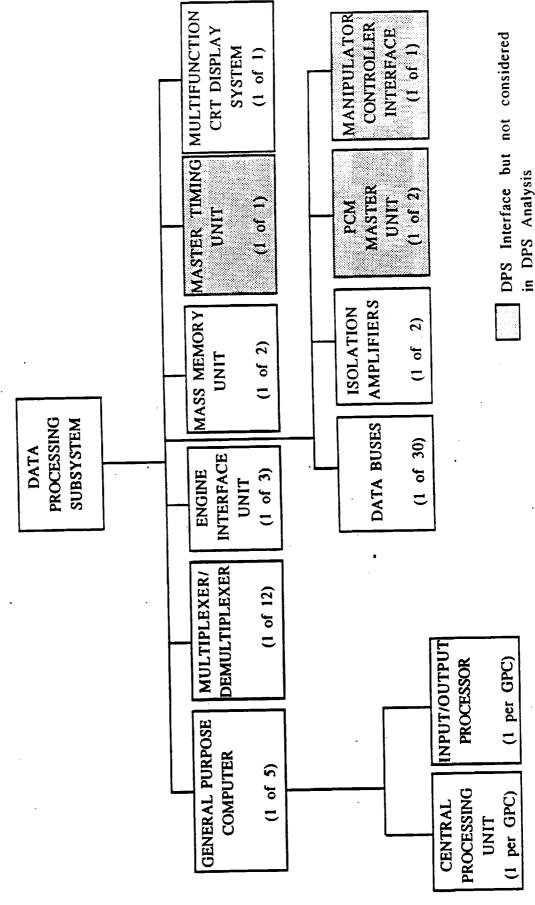


Figure 2 - DPS SUBSYSTEM OVERVIEW

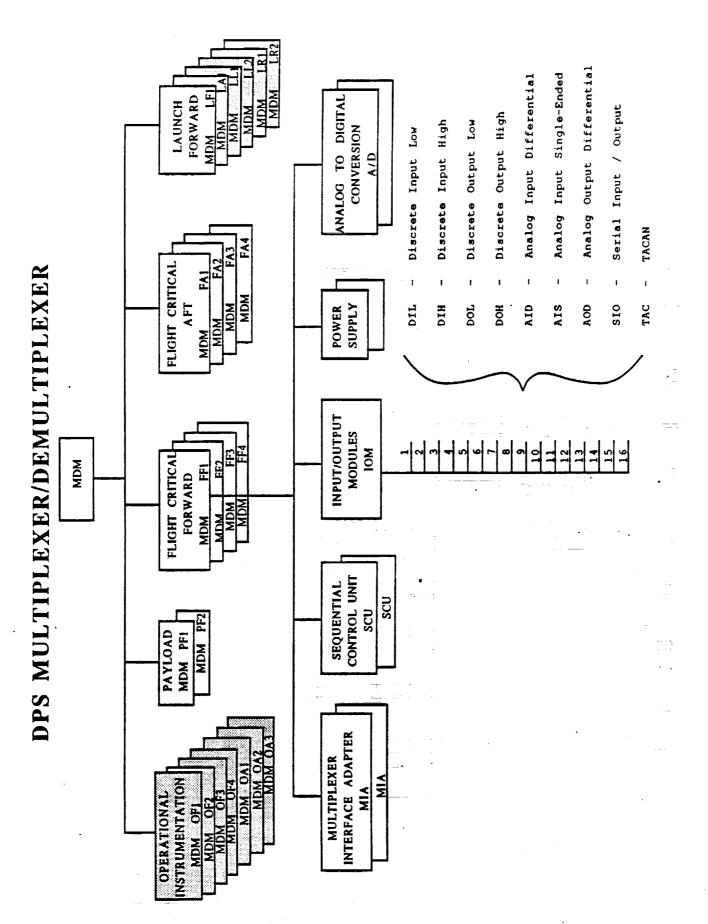


Figure 3 - DPS MULTIPLEXER/DEMULTIPLEXER (MDM)

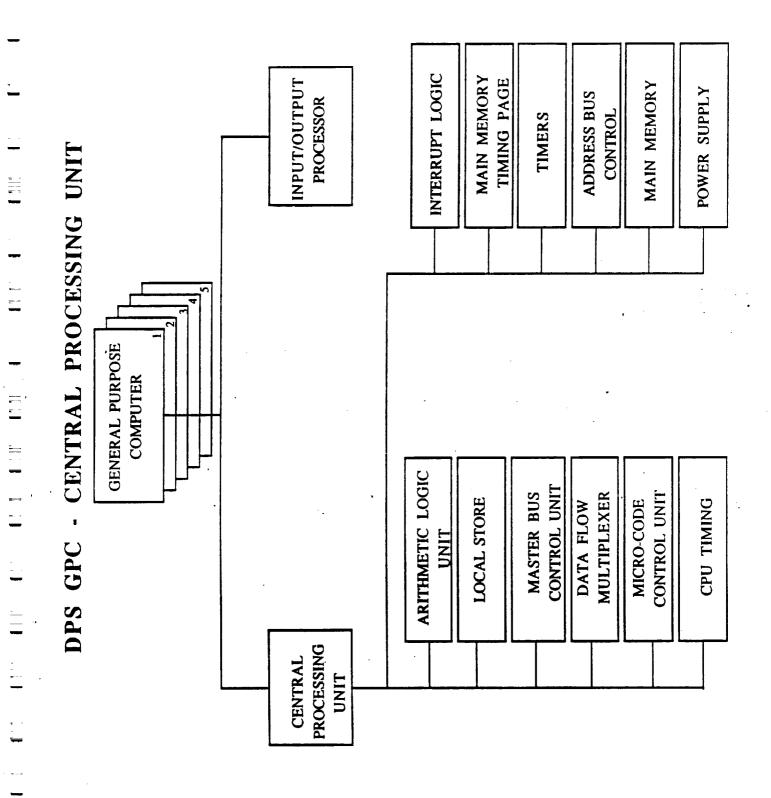


Figure 4 - DPS GPC CENTRAL PROCESSING UNIT (CPU)

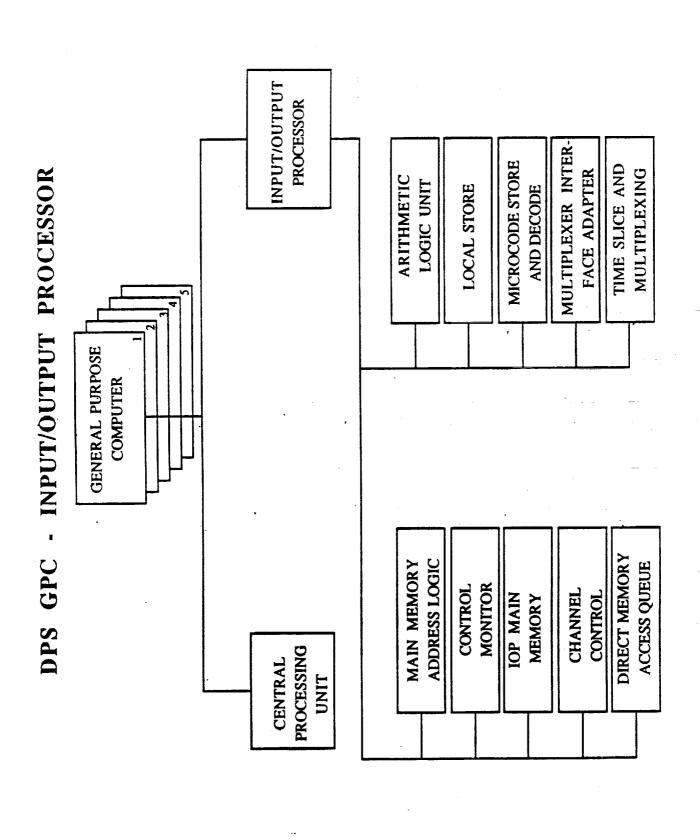


Figure 5 - DPS GPC INPUT/OUTPUT PROCESSOR (IOP)

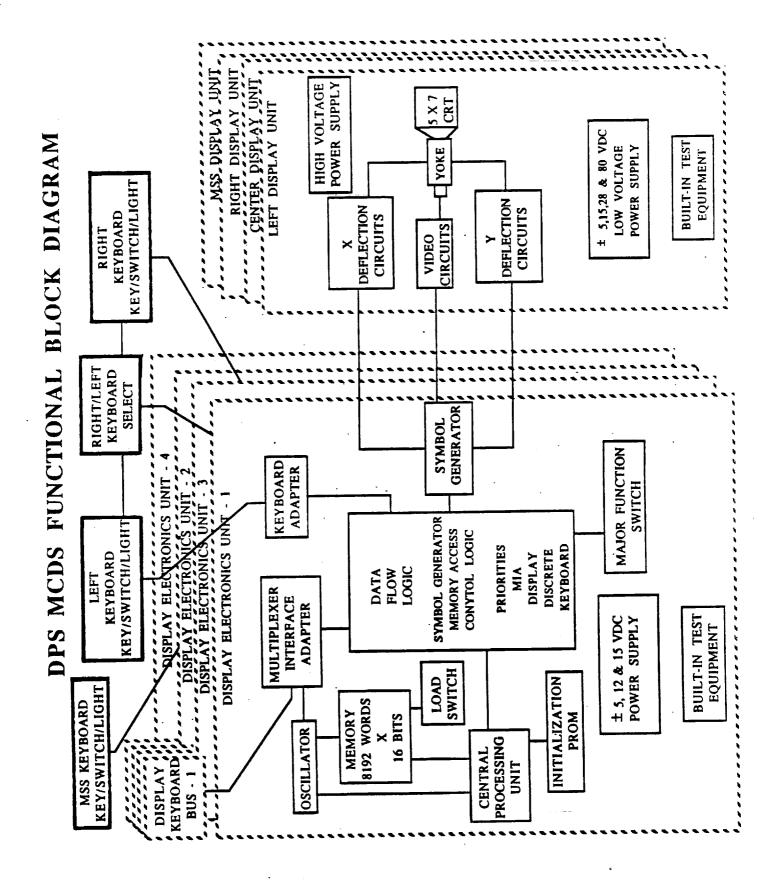


Figure 6 - DPS MCDS FUNCTIONAL BLOCK DIAGRAM

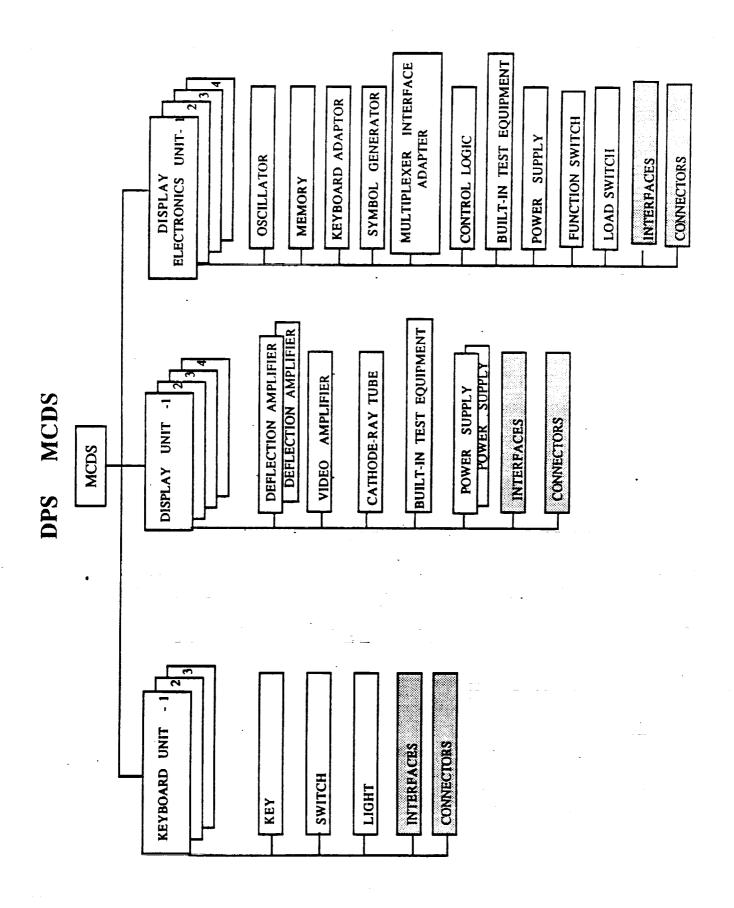


Figure 7 - DPS MCDS

# DPS DATA BUS COUPLERS

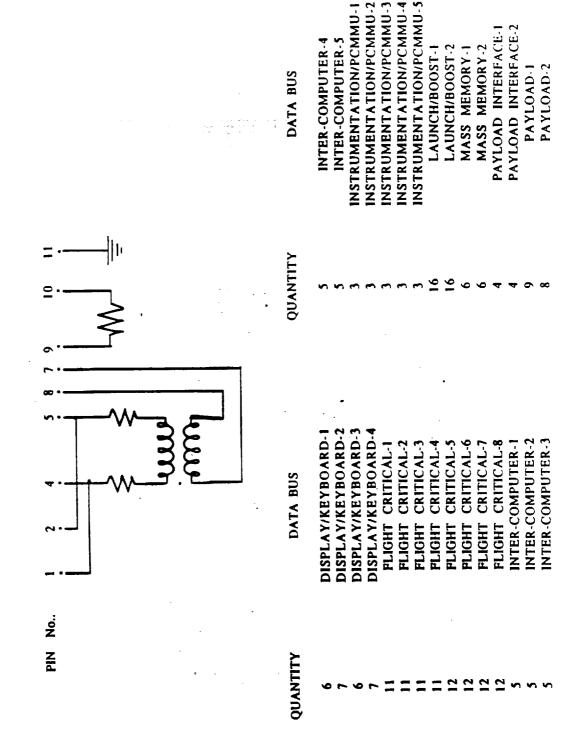


Figure 8 - DPS DATA BUS COUPLERS (DBC)

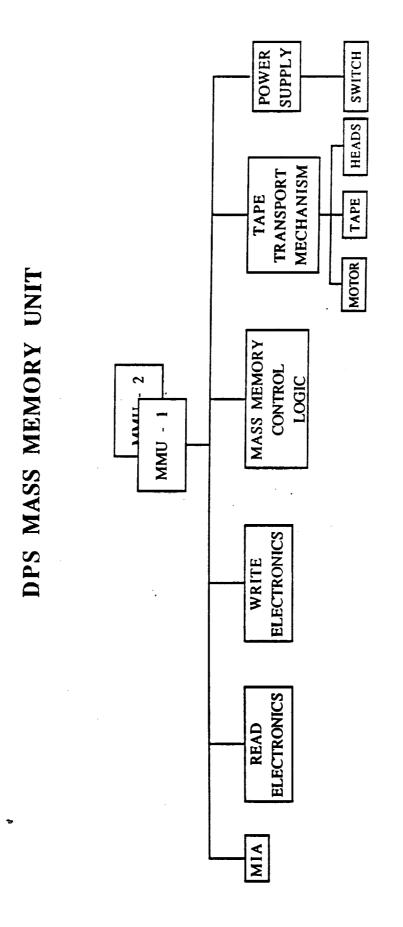


Figure 9 - DPS MASS MEMORY UNIT (MMU)

# FOWER SUFFE POWER SUPPLY BUILT-IN TEST EQUIPMENT DPS ENGINE INTERFACE UNIT CE PENOUNE INTERCACE DIVIT (EIU) ENUMBERATERFACE DIVIT (EIU) ENGINE INTERFACE UNIT (EIU) - 1 CONTROLLER INTERFACE MULTIPLEXER INTERFACE SIATOS BUFFER-2 ADAPTER STATUS BUFFER-1 **ADAPTER - 3** ADAPTER - 1 ADAPTER ADAPTER - 2 ADAPTER - 1 OPERATIONAL INTERFACE ELEMENT DATA STATUS

Figure 10 - DPS ENGINE INTERFACE UNIT (EIU)

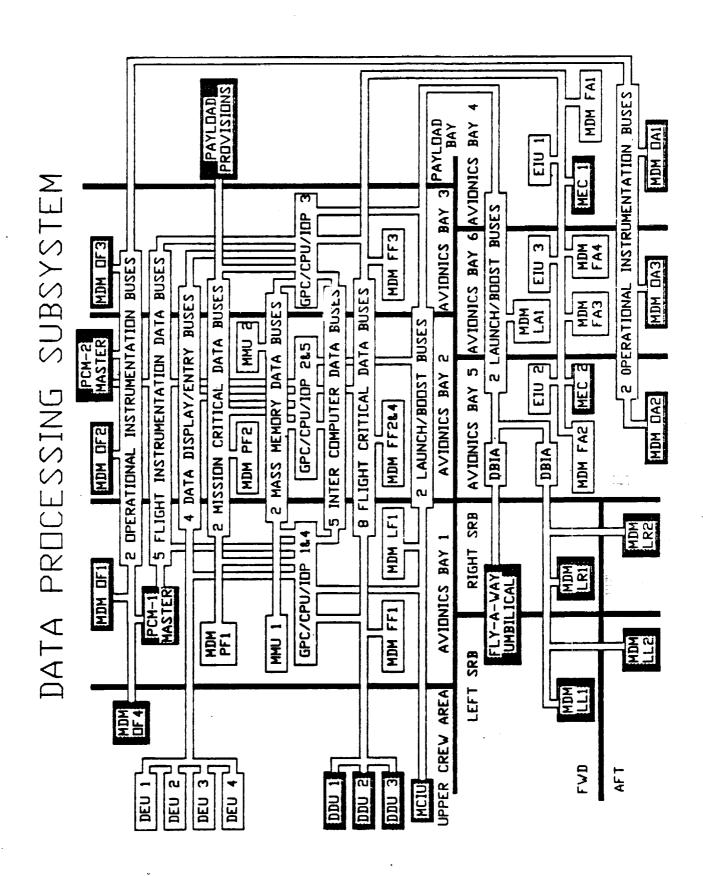


Figure 11 - DPS FUNCTIONAL INTERFACES AND LOCATIONS

### 4.0 ASSESSMENT RESULTS

The IOA analysis of the DPS hardware initially generated eightyfive failure mode worksheets and identified two Potential Critical Items (PCIs) before starting the assessment process. order to facilitate comparison, thirty-seven additional failure mode analysis worksheets were generated. These analysis results were compared to the proposed NASA Post 51-L baseline of seventyeight FMEAs and twenty-five CIL items, which was generated using the Rockwell 100-2G FMEA/CIL instructions. Upon completion of the assessment, sixty of the seventy-eight FMEAs were in agreement. Of the eighteen that remained, fourteen had minor discrepancies that did not affect criticality. Of the remaining four, two issues were with FMEAs (05-5-B03-1-1 and 05-5-B03-2-1) that had considered failure modes outside the DPS subsystem, and caused inflated criticalities. These criticalities mistakenly placed both FMEAs on the CIL. The other two issues were with FMEAs (05-5-B01-1-1) and 05-5-B02-1-1 that also considered failure modes outside the DPS subsystem. However, when the correct failure mode is included, the current criticalities will remain unchanged. In summary, all issues may be attributed to differences between ground rules in Rockwell 100-2G and NSTS 22206 instructions. The TOA recommends correcting the failure modes considered in the four FMEAs, which lowers criticality assignments in two of the FMEAs, and removes them from the CIL.

A summary of the quantity of NASA FMEAs assessed, versus the recommended IOA baseline, and any issues identified is presented in Table I.

Table I Summary of IOA FMEA Assessment							
Component	NASA	IOA	Issues				
MDM GPC MCDS DBC DBIA MMU EIU	14 25 23 1 2 9	14 25 23 1 2 9	2 2 - - - - -				
TOTAL	78	78	4				

A summary of the quantity of NASA CIL items assessed, versus the recommended IOA baseline, and any issues identified is presented in Table II.

Table II	Summary of	IOA CIL Assess	ment
Component	NASA	IOA	Issues
MDM GPC MCDS DBC DBIA MMU EIU	10 6 3 1 - 1 4	8 6 3 1 - 1 4	2 - - - - -
TOTAL	25	23	2

Appendix C presents the detailed assessment worksheets for each failure mode identified and assessed. Appendix D highlights the NASA Critical Items and corresponding IOA worksheet ID. Appendix E contains the IOA analysis worksheets that were used to assess the NASA FMEA/CIL. Appendix F provides a cross reference between the NASA FMEA and corresponding IOA worksheet(s). IOA recommendations are also summarized.

Table III presents a summary of the IOA recommended failure criticalities for the Post 51-L FMEA baseline. Further discussion of each of these subdivisions and the applicable failure modes is provided in subsequent paragraphs.

TABLE III Summary of IOA Recommended Failure Criticalities							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
MDM GPC MCDS DBC DBIA MMU EIU	- - - - - 2	4 5 3 1 - - 2	- - - - 1	6 9 14 - - -	2 1 1 - 1 6	2 10 5 - 1 2	14 25 23 1 2 9
TOTAL	2	15	1	29	11	20	78

Of the failure modes analyzed, twenty-three were determined to be critical items. A summary of the IOA recommended critical items is presented in Table IV.

+							
TABLE IV	Summary	of IO	A Recon	mended	Critica	al Item	ns 
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
MDM GPC MCDS DBC DBIA MMU EIU	- - - - - 2	4. 5 3 1 - 2	- - - - 1	4 1 - - - -	- - - - -	- - - -	8 6 3 1 - 1 4
TOTAL	2	15	1	5	-	_ -	23

The scheme for assigning IOA assessment (Appendix C) and analysis (Appendix E) worksheet numbers is shown in Table V.

	Table V IOA Worksheet Numbers
Component	IOA ID Number
MDM GPC MCDS MMU EIU	DPS-100 to DPS-195 DPS-201 to DPS-232 DPS-300 to DPS-321 (includes DBC and DBIA) DPS-400 to DPS-417 DPS-501 to DPS-509

### 4.1 Assessment Results MDM

The IOA has a total of forty-two assessment worksheets associated with the fourteen NASA MDM FMEAs; excluding the OF, OA, LL, and LR MDM groups, as shown in Figure 3. The IOA worksheets correspond to nine different failure modes for each of the four groups of MDMs, plus six worksheets that are power related. The numbering scheme is shown in the table below.

IOA ID Range	Item Group
DPS-100 to 108	FF - Flight Forward
DPS-120 to 128	FA - Flight Aft
DPS-140 to 148	PF - Payload Forward
DPS-180 to 188	LF,LA - Launch Forward and Aft
DPS-190 to 195	Power related: RPCs, switches, and
	resistors

Three basic failure modes were found: Loss of Output, Erroneous Output, and Premature Operation. A failure mode may have a different effect, and thus a different criticality, if applied separately to both output sides of a MDM; that is, a MDM's outputs to GPCs and LRUs (such as sensors and effectors). Thus it was decided to treat each output side separately for each basic failure mode, resulting in six failure modes; such as "Loss of Output to GPC" and "Loss of Output to LRU". As it turned out, the effects were somewhat different but the criticalities remained the same.

Three other failure modes were added which were considered applicable to only one output. These are "Selected All Channels Wrong to LRU" (worksheets DPS-106, 126, 146, and 186), "Stuck on a Constant Output to LRU" (DPS-107, 127, 147, and 187), and "Falsely Stuck on Busy Mode" to GPC (DPS-108, 128, 148, and 188). The first two specific failure modes could be considered special cases of "Erroneous Output to LRU", and the third failure mode could be considered a special case of "Loss of Output to GPC". They were considered on the possibility that the specific cases would differ in effects and criticality from the general cases. Again, the result was that these specific cases differed in their effects but not in their criticalities from the general cases.

The NASA FMEAs considered general failure modes, consequently each output and specific cases were not covered uniquely. This resulted in one (NASA FMEA) to many (IOA worksheets) relationships, as shown in the following table. This table shows how the NASA FMEAs and IOA worksheets associated with MDMs map onto each other.

Failure Mode	Item	NASA FMEAs	IOA Assessment Worksheets (Appendix. C)
Loss of		05-5-B03-2-1	100, 101, 108
		05-5-B03-1-1	120, 121, 128
-	PF	05-5-B03-5-1	140, 141, 148
	LF,LA	05-5-B03-4-1	180, 181, 188
		05-5-B03-2-2	
Output		05-5-B03-1-2	
_		05-5-B03-5-2	
		05-5-B03-4-2	182, 183, 186, 187
		no map	
			124, 125
o m o p u o		no map	144, 145
·		no map	184, 185
Miscell-	Resistor	05-6S-BRES3-1	190
aneous	RPC	05-6S-BRPC3-1	191
	RPC	05-6S-BRPC3-2	192
	Switch	05-6S-BSW3 -1	193
	Switch	05-6S-BSW3 -2	194
	Switch	05-6S-BS <b>W</b> 5 -3	195

The number of FMEAs and CILs by criticality are summarized in the following table. The Unmapped IOA column is the raw number of IOA analysis worksheets. The Mapped IOA column is the number of IOA analysis worksheets after they have been mapped onto the NASA FMEAs.

	Unmapped	Mapped			
Criticality	IOA	IOA	NASA	IOA CILS	Issues
2/1R	15	4	<del></del> 6	4	2
2/2	0	0	0	0	0
3/1R	16	6	4	4	0
3/2R	9	2	2	0	0
3/3	2	2	2	0	0
Total	42	14	14	8	2

The NASA FMEAs also covered power related items associated with the MDMs, including Remote Power Controllers (RPCs), Power Switches, and Current Limiting Resistors. IOA did not cover these items in the original analysis due to time constraints, but did cover them later, concurring with NASA's reevaluation of these six. IOA's DPS subsystem team did not cover the Operational Instrumentation Forward and Aft (OA and OF) MDMs, since they were considered to be in the domain of IOA's Instrumentation subsystem team. IOA and NASA also did not cover the Launch Left and Launch Right (LL and LR) MDMs since they are within the SRBs.

The difference in the number of FMEAs is due to the fact that IOA considered more specific failure modes than NASA. Another difference is that NASA did not consider the "Premature Operation to GPC" and "Premature Operation to LRU" failure modes for MDMs. This however is not an issue since the criticality of the function of the hardware item (2/1R) was not increased by these failure modes. Also, after further analysis these failure modes are considered to be non-credible.

The criticalities for the LF and LA MDMs (3/2R) were the same for IOA and NASA. For the FF, FA, and PF MDMs however, IOA's criticalities (3/1R) were lower than NASA's criticalities (2/1R). Part of this difference is due to whether the effects of multiple unrelated failures were taken into account. The NASA, using the Rockwell 100-2G hardware criticality 2 ground rules, considered in FMEAS 05-5-B03-1-1 and 05-5-B03-2-1, a MDM failure and then considered an Aero Surface Amplifier (ASA) next related failure outside the DPS subsystem. Whereas, the IOA, using NSTS 22206, considered in assessment worksheets DPS-100, DPS-101, DPS-108, DPS-120, DPS-121, and DPS-128, a MDM failure and then considered the next redundant item failure to be another MDM. The IOA does not concur with these two NASA reevaluations. The IOA believes the hardware criticality should be downgraded to three, thereby removing these two FMEAs from the CIL. The IOA concurred with the remaining twelve FMEAs.

### 4.2 Assessment 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. IOA has analyzed twenty-five failure modes (FMEAs) related to the General Purpose Computers (GPCs). Four of these FMEAs are attributable to the Input/Output Processors (IOP), eleven are related to the Central Processing Units (CPU), and the remaining ten affect various EPD&C switch functions associated with the GPC. NASA wrote twenty-five GPC related FMEAs: two CPU related, two IOP related, five switch related, four GPC status related, and two GPC power related. The following table is a summary of the GPC related FMEA criticalities including the results of the DPS Pre-board:

Criticality	IOA	NASA	IOA CILS	<u>Issues</u>
2/1R	5	5	5	2
3/1R	9	9	1	0
3/2R	1	1	0	0
3/3	10	10	0	0
Total	25	25	<del>6</del>	. 2

The seven NASA proposed individual power component failures (FMEA 05-6S-BDIOx-1, 05-6S-BDMC1-1, 05-6S-BDMC1-2, 05-6S-BFUS1-1, 05-6S-BRES1-1, 05-6S-BRPC1-1, and 05-6S-BRPC1-2) were analyzed, along with the four failures of the GPC status indicators. These failure modes are covered in Appendix E.

Of the five switch related failures analyzed by NASA, the CPU Output Switch FMEAs (05-5-B15-1-1 and 05-5-B15-1-3) agree with the IOA assessment (DPS-211) as does the Mode Switch FMEA (05-5-B17-1-1, DPS-210). One GPC Power Switch FMEA (05-6S-BSW1-2) written by NASA is confirmed by a similar TOA FMEA (DPS-216) as criticality 3/1R; the newly-proposed GPC Power Switch FMEA (05-6S-BSW1-3) is consistent with the IOA analysis DPS-217. IOA agrees with the assessment that inadvertent power switch opening has the same effects as CPU Loss of Output (05-5-B01-1-1).

The NASA and IOA analyses of the CPU and IOP erroneous output FMEAs (05-5-B01-1-2, 05-5-B02-1-2, DPS-206 and DPS-202, respectively) are identical in criticality 3/1R, as are the analyses of the inadvertent command outputs from the IOP with criticality 2/1R (05-5-B02-1-3, DPS-225). An IOA analysis of erroneous data inputs to the IOP (DPS-204) brought similar effects with 3/1R criticality.

The IOA analyzed a failure mode (DPS-208) on the CPU which was not considered by NASA. This 2/1R failure is similar in effect to the IOP inadvertent command output failure (05-5-B02-1-3): CPU attempts to output data on incorrect bus due to errors in memory locations containing configuration or bus-stringing parameters (e.g. the Nominal Bus Assignment Table). In this case two output data channels would be lost simultaneously and the actuators would not be able to select the correct data paths. IOA determined this to be a non-credible failure mode during the assessment process.

The NASA analysis of the CPU "Loss Of Output" (05-5-B01-1-1) has a criticality of 2/1R. IOA analysis 205, using the NSTS 22206 does not take into account the effects of multiple unlike failures outside the DPS subsystem. IOA does not agree with the effects assigned by NASA. The IOA recommends changing the effects to delete the sentence "During ascent/entry, this...". The IOA does concur with the rest of NASA's reevaluation and rationale.

The NASA analysis of the IOP "Loss of Output" (05-5-B02-1-1) has a criticality of 2/1R. Initially, the IOA analysis 201 assigned a hardware criticality of 3 for this failure mode. The IOA does not believe a single IOP failure would cause loss of mission. The second failure of an IOP would not result in loss of crew/vehicle. However, NASA's failure effects coupled this failure with an undetected ASA failure (outside the DPS subsystem). This could result in two healthy paths being voted out. This could possibly cause loss of vehicle. Simultaneous dissimilar failures were excluded from the IOA. Multiple failures are inconsistent with the NSTS 22206. The IOA recommends changing the effects to delete the sentence "During ascent/entry, this...". The IOA does concur with the rest of NASA's reevaluation and rationale.

### 4.3 Assessment Results MCDS

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, thirty IOA assessment worksheets and twenty-one IOA analysis worksheets were generated. These were then compared to the twenty-three NASA FMEAS. The difference in the total number of FMEAS may be attributed predominantly to the fact that NASA has one FMEA per failure mode whereas IOA has multiple failure modes per worksheet. The additional seven IOA assessment worksheets yielded no additional unique FMEAs and are not included in the comparison FMEA count. They are included in the Appendices for completeness. No issues were identified.

	Number	of	FMEAs by	criticality	
Criticality	AOI		NASA	IOA CIL	Issues
2/1R			3	3	0
3/1R	15		15	0	0
3/3	5		5	σ	0
Total	23		23	3	. 0

### 4.4 Assessment 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 issues were identified.

Number	of FMEAs	by critic	ality	
Criticality	IOA	NASA	IOA CIL	<u>Issues</u>
2/10	<del></del>		1	0

### 4.5 Assessment Results DBIA

The DBIAs consists of components required to provide isolation between the Orbiter Launch/Boost Data Buses and the SRBs and associated GSE. Four failure modes were identified and two worksheets were generated. No issues or CILs were identified.

Number of FMEAs by criticality					
Criticality	IOA		NASA	IOA CIL	<u>Issues</u>
3/2R	1		1	0	0
3/3	1		1	0	0

### 4.6 Assessment 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. One critical item was identified.

Number	of MMU	related FMEA	s by criti	cality
Criticality	IOA	NASA	IOA CIL	<u>Issues</u>
2/2	1	1	1	0
3/2R	6	6	0	Ø
3/3	2	2	0	
Total	9	<del></del> 9	1	0

The IOA 400 through 407, 411 and 412 correspond to NASA FMEAS 05-5-B04-2-1 and 05-5-B04-2-2. These FMEAs are concerned with malfunctions of the MMU unit itself. The difference in number of FMEAs is due to the fact that the IOA analysis considered failures of individual components of the MMU, such as the tape transport mechanism. There was no significant difference in the results. Both IOA and NASA found the criticality to be 3/2R.

Four NASA FMEAs (05-6S-BRPC2-1, 05-6S-BSW2-1, 05-6S-BSW2-2, and an as yet unnumbered new item) correspond to IOA FMEAs 408, 409, and 410. These FMEAs deal with failures of the MMU power switches and RPCs. The only difference in the results in this group is that IOA found the switch failure mode which causes the MMU to remain permanently on to be criticality 3/3 rather than 3/2R. The NASA agreed with this criticality in their reevaluation report.

The IOA FMEA 415 corresponds to NASA FMEA 05-5-B20-1-1. This FMEA deals with failure of the GPC IPL source switch. Both IOA and NASA found the criticality to be 2/2. This is the only CIL item associated with the MMUs.

The NASA FMEAs 05-5-B16-1-1 (GPC IPL switch, criticality 3/2R), 05-5-B18-1-1 (GPC IPL indicator, criticality 3/3), and 05-6S-BRES2-1 (current limit resistor, criticality 3/2R) were analyzed by IOA and are contained in Appendix E. No issues were identified.

### 4.7 Assessment Results EIU

There were no differences between the hardware and functional criticalities assigned by IOA and NASA on the baseline FMEAs of the Engine Interface Unit (EIU).

Number of EIU related FMEAs by Criticality.

Criticality	IOA	NASA	IOA CILS	Issues
1/1	0		2	0
2/1R	Ō	2	2	0
3/1R	5	0	0	0
Totals	5	4	4	0

The NASA presented at the Level III Pre Board (12th and 15th of September, 1986) requests to upgrade the two existing FMEAs from 3/1R to 2/1R. The rationale presented was for a heavy payload. The loss of one engine can cause loss of mission. The IOA can accept this upgrade of criticality based upon a combined payload and vehicle weight requiring three main engines to achieve mission orbit goals.

The second upgrade was requested against the power circuit. The loss of the second circuit causes loss of the EIU. The worst case failure would occur during the last 10 seconds prior to MECO when the crew may not have enough time to respond to manual engine shutdown. This could cause an engine to have fuel or oxidizer depletion with engine running. Previous tests have indicated that pumps fail due to cavitation. In fact, the engine turbine pumps have exploded from cavitations. The IOA agrees with this upgrade and rationale.

There were two new FMEAs proposed by NASA at the pre-board with criticalities of 1/1.— The first was for a failure mode of erroneous output to the GPC. The GPC would then command the pre-valves to close with the engine running. That would cause the high pressure turbine pumps to throw turbine blades which have caused uncontained engine failures. The engine explodes and the crew and vehicle are lost.

The second proposed FMEA deals with the failure of the power switch. The failure mode was both contacts shorted to ground. The loss of power to the EIU causes loss of control of engine throttling and shutdown. If failure occurs in the last six to ten seconds before MECO, the crew would have to manually shutdown the engines. The engines would ingest gas causing pump cavitation and disintegration. This results in loss of crew and vehicle.

Four additional failure modes were analyzed by IOA, but following the pre-board these modes were found to be covered by one of the original baseline FMEAs.

### 5.0 REFERENCES

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, Booster-Systems 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. V72 Vol III, Operations and Maintenance Requirements and Specification Document Orbiter OMRSD DPS, 6-13-86.
- 11. STS82-0032 Orbiter Vehicle Operational Configuration FMEA for DPS Subsystem, Revised 1-28-83.
- 12. VS70-973099 Integrated System Schematic, Rev AlO, 10-17-85.
- 13. JSC-18730 Orbiter Operational Configuration Critical Items List, 12-17-82.
- 14. NSTS 22206, Instructions for Preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List(CIL), 10-10-86.
- 15. MDAC IOA DPS Working Paper No. 1.0-WP-VA86001-02, 10-24-86.
- 16. NASA-JSC FMEA & CIL Review Comments,
  - A. DPS GPC's and MCDS and EPD&C DPS Items, 9-11-86.
  - B. Engine Interface Unit (EIU), 9-19-86.
  - C. Mass Memory Unit (MMU), 9-19-86.
  - D. MDM, DBC, & DBIA, 8-22-86.

# APPENDIX A ACRONYMS

- Analog to Digital A/D - Analog Input Differential AID - Analog Input Single-ended AIS - Arithmetic Logic Unit ALU AOA - Abort Once Around AOD - Analog Output Differential ASA - Aero Surface Amplifier ATO - Abort To Orbit Backup Flight Controller BFC - Backup Flight System BFS - Built-In Test Equipment BITE - Backup System Services BSS BTU Bus Terminal Unit Critical Item CI CIA - Controller Interface Adapter - Computer Interface Conditioning Unit CICU - Critical Items List CIL CPU - Central Processing Unit CRIT - Criticality - Cathode Ray Tube CRT - Caution and Warning System C&W DBC - Data Bus Coupler - Data Bus Isolation Amplifier DBIA DDU Display Driver Unit DEU - Display Electronics Unit DIH - Discrete Input High DIL - Discrete Input Low - Direct Memory Access DMA DOH - Discrete Output High DOL - Discrete Output Low DPS - Data Processing System Display Unit DU Engine Interface Unit EIU **EVA**  Extravehicular Activity FA Flight Aft FCOS Flight Control Operating System FF - Flight Forward FM - Failure Mode - Failure Mode and Effects Analysis **FMEA** - General Purpose Computer GPC Ground Support Equipment GSE - Inertial Measurement Unit IMU - Independent Orbiter Assessment IOA IOM Input/Output Module - Input/Output Processor IOP IPL - Initial Program Load Keyboard Unit KU

- Launch Aft LA - Launch Forward LF - Launch Left LL- Launch Processing System LPS - Launch Right LR - Line Replaceable Unit LRU - Memory Configuration MC - Multifunction CRT Display System MCDS - Manipulator Controller Interface Unit MCIU - McDonnell Douglas Astronautics Company MDAC - Multiplexer/Demultiplexer MDM - Main Engine Controller MEC - Multiplexer Interface Adapter MIA - Major Mode MM - Mass Memory Unit MMU Master Timing Unit MTU - Master Timing Unit
- Not Applicable NΑ - National Aeronautics and Space Administration NASA - National Space Transportation System - Operational Forward
- Operational Interface Element
- Operational Maintenant OA OF OIE OMRSD - Operational Maintenance Requirements and Specifications Document - Orbital Maneuvering System OMS - Operational Sequence OPS - Potential Critical Item PCI - Pulse Code Modulation **PCM** - Payload Forward PF - Reaction Control System RCS - Rotational Hand Controller RHC RI - Rockwell International - Redundancy Management RM - Remote Manipulator System RMS - Remote Power Controller RPC RS - Redundant Set - Return To Landing Site
- Sequential Control Unit RTLS - Sequential Control Unit SCU - Serial Input/Output SIO - Systems Management - Space Shuttle Main Engine
- Space Transport SRB SSME STS - Space Transportation System - Software SW கொருந்தத்தை நீர் இ**இ**ருக்க வருக TAC - Tacan - Transatlantic Abort Landing TAL - Touch Down TD - Translational Hand Controller - Volts Direct Current THC VDC

#### APPENDIX B

#### DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

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

### APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

#### B.1 Definitions

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

#### INTACT ABORT DEFINITIONS:

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

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

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

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

<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

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

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

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

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

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

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

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

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

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

OPS - software operational sequence

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

#### PHASE DEFINITIONS:

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

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

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

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

### APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.2 IOA Project Level Ground Rules and Assumptions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### 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. Crew procedures that take the two good FCS channels to override following two GPC or two MDM failures are considered in assigning criticality.

RATIONALE: Clarifies standard cockpit procedures that can be considered in assigning criticality.

### APPENDIX C DETAILED ASSESSMENT

This section contains the IOA assessment worksheets generated during the assessment of this subsystem. The information on these worksheets facilitates the comparison of the NASA FMEA/CIL (Pre and Post 51-L) to the IOA detailed analysis worksheets included in Appendix E. Each of these worksheets identifies the NASA FMEA being assessed, corresponding MDAC Analysis Worksheet ID (Appendix E), hardware item, criticality, redundancy screens, and recommendations. For each failure mode, the highest assessed hardware and functional criticality is compared and discrepancies noted as "N" in the compare row under the column where the discrepancy occurred.

### LEGEND FOR IOA ASSESSMENT WORKSHEETS

#### Hardware Criticalities:

- 1 = Loss of life or vehicle
- 3 = All others

#### Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which,
   if failed, could cause loss of life or vehicle
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission

#### Redundancy Screens A, B and C:

P = Passed Screen

F = Failed Screen

NA = Not Applicable

#### NASA Data:

Baseline = NASA FMEA/CIL

New = Baseline with Proposed Post 51-L Changes

CIL Item :

X = Included in CIL

Compare Row :

N = Non compare for that column (deviation)

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-100 05-5-B03-2-1		NASA DATA: BASELINE NEW					
SUBSYSTEM: MDAC ID:	DPS	<u> </u>		e de la companya de La companya de la companya de l				
LEAD ANALYST:	W. A. Haufler		· · · • • • ·					
ASSESSMENT:	<u> </u>		•					
CRITICAL	TY REDUNDA	NCY SCREENS		CIL ITEM				
HDW/FUN	r IC A	B	С	IILM				
NASA [ 2 /lR IOA [ 3 /lR	] [ P ] ] [ P ]	[ P ] [ [ P ] [	P ] P ]	[ X ] * [ ]				
COMPARE [ N /		[ ] [	]	[ N ]				
RECOMMENDATIONS:	RECOMMENDATIONS: (If different from NASA)							
[ 3 /1R	] [P]	[P] [	P]	[ D ] DD/DELETE)				
* CIL RETENTION F	RATIONALE: (If a		ADEQUATE ADEQUATE					
REMARKS: SIMULTANEOUS DISSIMILAR FAILURES WERE EXCLUDED FROM THE IOA, MULTIPLE FAILURES ARE INCONSISTENT WITH THE NSTS 22206. IOA RECOMMENDS REPLACING THIS PHRASE IN THIS NASA/RI FMEA'S EFFECTS FIELD "COUPLED WITH AND UNDETECTED FCS FAILURE (IN THE NULL POSITION)," WITH "COUPLED WITH A LIKE FAILURE IN ANOTHER MDM". IOA DID NOT CONSIDER DEGRADED STATE VECTORS. IOA DOES NOT BELIEVE THE LOSS OF TWO STATE VECTORS WILL CAUSE LOSS OF CREW OR VEHICLE. IN THE WORST CASE ON ENTRY, THE LOSS OF THE SECOND STATE VECTOR WILL PERMIT THE ORBITER TO FLY WITH ONE REMAINING STATE VECTOR. IOA DOES NOT CONCUR WITH NASA'S REEVALUATION AND RATIONALE. IOA RECOMMENDS DOWNGRADING HARDWARE CRITICALITY TO 3, THEREBY REMOVING THE FMEA FROM THE CIL.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-101 05-5-B03-2-1	NASA DATA: BASELINE [ X ] NEW [ ]						
MDAC ID:	DPS 101 MDM FF1,FF2,FF3,FF	4						
LEAD ANALYST:	W. A. Haufler							
ASSESSMENT:								
CRITICAL FLIGH	ITY REDUNDANCY T	SCREENS CIL ITEM						
HDW/FU	NC A B	C						
NASA [ 2 /lR IOA [ 3 /lR	] [P] [P]	[P] [X]* [P] [X]						
COMPARE [ N /	] [ ] [	) [ ] [ N ]						
RECOMMENDATIONS:	(If different fr	om NASA)						
[ 3 /1R	] [P] [P	[D] [D] (ADD/DELETE)						
* CIL RETENTION	RATIONALE: (If appl	icable)  ADEQUATE [ X ]  INADEQUATE [ ]						
REMARKS: THIS FAILURE MODE "LOSS OF OUTPUT TO LRU" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "NO OUTPUT: FAILED MDM PORT - SCU, MIA, A/D, POWER SUPPLIES, OR I/O CARD/CHANNEL FAILURE". SIMULTANEOUS DISSIMILAR FAILURES WERE EXCLUDED FROM THE IOA. MULTIPLE FAILURES ARE INCONSISTENT WITH THE NSTS 22206. IOA RECOMMENDS REPLACING THIS PHRASE IN THIS NASA/RI FMEA'S EFFECTS FIELD, "COUPLED WITH AND UNDETECTED FCS FAILURE (IN THE NULL POSITION)", WITH "COUPLED WITH A LIKE FAILURE IN ANOTHER MDM". IOA DID NOT CONSIDER DEGRADED STATE VECTORS. IOA DOES NOT BELIEVE THE LOSS OF TWO STATE VECTORS WILL CAUSE								
LOSS OF CREW OR '	VEHICLE. IN THE WO VECTOR WILL PERMI	RST CASE ON ENTRY, THE LOSS OF I THE ORBITER TO FLY WITH ONE						
IOA DOES NOT CON	CUR WITH NASA'S REE RADING HARDWARE CRI	VALUATION AND RATIONALE. IOA TICALITY TO 3, THEREBY						

ASSESSME NASA FME	NT	II	D:	DP	s-10	2		:-2								BASEL		[	X	]	
SUBSYSTE MDAC ID: ITEM:	М:			DP 10 MC	2	Fl,	, Fl	F2,FF	3,	F	F4	•									
LEAD ANA	LYS	ST	:	w.	A.	Ha	uf	ler													
ASSESSME	NT:	:																			
		FI	CALI LIGHT	<b>C</b>			RE A	DUND	AN		Y B	SCR	EE	NS	c			CI			
			•			_		_	_		_	_		_		_		_			
NASA IOA	[	3	/lR /lR	]		[	P	]	] ]		P	]			P	]		[	<b>X</b>	] *	•
COMPARE	[	N	/	J		[		]		[		]		[		]		[	N	]	
RECOMMEN	IDA!	ri	ons:		(Íf	đi	fi	feren	t	f	r	om N	IAS.	A)							
	[		/	]		[		]	(	•		]		[		]	(A	[ DD/	DE	] LET	E)
* CIL RE	TEN	T	ON I	TAS	IONA	LE	::	(If a	ap	p.	1 i	.cab			ΑĽ	EQUA:	ΓE	[	X	]	
REMARKS: IOD DID IOA DOES NO DIFFE	CC	ONC	CUR 1																		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-103			BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	DPS 103 MDM FF1	1,FF2,FF3,F	F4		
LEAD ANALYST:	W. A. H	aufler			
ASSESSMENT:					
CRITICAL FLIGH HDW/FU	T	REDUNDANC A	y screen B	rs C	CIL ITEM
NASA [ 2 / LF IOA [ 3 / LF	] [	P ] [ P ] [	P ] [ P ] [	P ] P ]	[ X ] * [ ]
COMPARE [ N /	] [		]	[ ]	[ N ]
RECOMMENDATIONS	(If d	lifferent i	rom NAS	A)	
[ /	·1 [	ן נ	] [	[ ] (A)	[ ] ADD/DELETE)
* CIL RETENTION	RATIONAL	E: (If app	•	ADEQUATE	[ <b>x</b> ]
REMARKS: THIS FAILURE MODE COVERED BY THIS OUTPUT: ADDRESS MODULE SELECT FOR THE	ROCKWELI CHECK F. AILURE". TIALLY CO WITH NAS	E FMEA WITH AILURE, DA ONSIDER DEC	H FAILURI TA ERROR SRADED SI	E MODE "ERR TO MDM MO	RONEOUS DDULE, OR RS.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-104		A DATA: SELINE [ ]
MDAC ID:	DPS 104 MDM FF1,FF2,FF3,	FF4	
LEAD ANALYST:	W. A. Haufler		grand the second second
ASSESSMENT:			
CRITICAL: FLIGHT	TTY REDUNDANG	CY SCREENS	CIL ITEM
HDW/FUN	_	ВС	IIEM
NASA [ / IOA [ 3 /1R	] [ ] [	P ] [ P ]	[ ] *
COMPARE [ N /N	ј . [иј [	иј [иј	[ ]
RECOMMENDATIONS:	(If different	from NASA)	
\ ]	] [ ] [	] [ ]	[ ] (ADD/DELETE)
* CIL RETENTION F	RATIONALE: (If app		QUATE [ ]
REMARKS: ROCKWELL/NASA DII THIS FAILURE MODI BE NON-CREDIBLE.	E, "PREMATURE OPE	FAILURE MODE.	•

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/8 DPS-105 NONE			NASA DATA BASELINI NEV	Ξ [ ]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 105 MDM FF1	L,FF2,FF	3,FF4			
LEAD ANALYST:	W. A. Ha	aufler				
ASSESSMENT:						
CRITICAL FLIGH	r		ANCY SCRI		CIL ITEM	
HDW/FU	NC	A	В	С		
NASA [ / IOA [ 3 / 1R	] [	P ]	[ ]. [ <b>P</b> ]	[ P ]	[ ] *	
COMPARE [ N /N	) [	[ א ]	[ N ]	[ N ]	[ ]	
RECOMMENDATIONS:	(If d	ifferen	nt from N	ASA)		
[ /	] [	3	[ ]	[ ]	[ ADD/DELETE)	
* CIL RETENTION	RATIONAL	E: (If	applicabl	le) . ADEQUATE INADEQUATE	[ ]	
REMARKS: THIS FAILURE MOD BE NON-CREDIBLE.	E "PREMA	TURE OF	PERATION '	ro LRU" IS DI	ETERMINED T	20

	10/06/96 DPS-106 05-5-B03			NASA DATA BASELINE NEW	[ X ]
	DPS 106 MDM FF1,	,FF2,FF3	3,FF4		
LEAD ANALYST:	W. A. Ha	ufler			
ASSESSMENT:					
CRITICALI FLIGHT HDW/FUN	<b>5</b>	REDUNDA A	NCY SCREI	ens C	CIL ITEM
NASA [ 2 /1R IOA [ 3 /1R	] [	P ]. P ]	[ P ] [ P ]	[ P ] [ P ]	[ X ] *LAM
COMPARE [ N /	] [	3	[ ]	[ ]	[ N ]
RECOMMENDATIONS:	(If di	fferent	from NA	5 <b>A</b> )	
[ /	] [	]	[ ]	[ ] . (AI	[ ] DD/DELETE)
* CIL RETENTION F	RATIONALE	: (If a	pplicable	e) ADEQUATE INADEQUATE	[ X ]
REMARKS: IOA DID NOT INITI IOA DOES CONCUR V NO DIFFERENCES.					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-107			NASA DATA BASELINE NEW						
MDAC ID:	DPS 107 MDM FF1,	FF2,FF3,F	F4	٠.						
LEAD ANALYST:	W. A. Ha	ufler								
ASSESSMENT:										
CRITICALI FLIGHT		REDUNDANC	Y SCREEN	S	CIL ITEM					
HDW/FU		A	В	С						
NASA [ 2 /lR IOA [ 3 /lR	] [	P ] [ P ] [	P ] [ P ] [	P ] P ]	[ X ] *					
COMPARE [ N /	] [	] [	] [	. ]	[ N ]					
RECOMMENDATIONS:	(If di	fferent f	rom NASA	<b>.</b> )						
[ /	) [	] [	] [	] (A	[ ] DD/DELETE)					
* CIL RETENTION I	RATIONALE	: (If app	licable)							
			I	ADEQUATE NADEQUATE						
REMARKS: THIS FAILURE MODICONSIDERED TO BE "ERRONEOUS OUTPUT MODULE, OR MODULIOA DID NOT INITIOA DOES CONCUR!	COVERED T: ADDRE E SELECT IALLY CON	BY THIS R SS CHECK FAILURE". ISIDER DEG	TANT OUT OCKWELL FAILURE, RADED ST	PUT TO LRU FMEA WITH DATA ERRO	" IS FAILURE MODE R TO MDM					

NO DIFFERENCES.

ASSESSMI ASSESSMI NASA FMI	ent ent ea	D: #:	ATE: D:	10/ DPS 05-	/06/ 5-10: -5-B	86 8 03-	2-1						asa 1 Basei		[		-	
SUBSYSTE MDAC ID:	M:			DPS	5 3													
LEAD ANA	LY.	ST	:	w.	A. 1	łau	fle	r										
ASSESSME	INT	:																
	CR:	IT:	CAL LIGH	ITY		R	EDU	NDAN	CY	SCI	REENS	5	1209		CI	L		
	3		v/FU			A			В			С			**			
NASA IOA	]	2 3	/lR /lR	]		[ P [ P	]	]	P P	]	]	P P	]		[	X	] * ]	
COMPARE	[	N	/	]		[	]		[	]	[		]		[	N	]	
RECOMME					•					•	•		•			_		± 5 · ·
	[	3	/lR	]		[ P	]	[	P	]	[	P	]	(AI	[ DD/	D DE	] Let	E)
* CIL RE	Ē	ניבא	ON :	RATI	ONA	LE:	(I	f ap	pl:	ical		ΑI	DEQU <i>I</i>	TE		X		÷
REMARKS: THIS FAI		RE	MOD	E "F	'ALS	ELY	ST	UCK	ON	BUS	SY MO	DDI	e" Is	CON	ISI	DE	RED	TO
BE COVER FAILED MCARD/CHASIMULTAN MULTIPLE	RED IDM ANN NEOI	BY PO TEL US	THORT FAI DIS	IS F - SC LURI SIMI	ROCK CU, E". LLAR	WEL MIA FA	L F	MEA /D, RES	WI PO WE	TH : WER RE :	FAILI SUPI EXCLI	URI PLI UDI	E MO IES, ED FI	DE "1 OR I ROM !	THE (\0	OU 	TPU	T:
IOA RECO EFFECTS NULL POS	MM FII	ENI ELI ION	DS R ), " ()",	EPLA COUP WIT	ACIN LED H "C	G I WI	HIS TH PLE	PHF AN U D WI	LAS ND TH	E II ETE( A I	N THI CTED LIKE	E 1 FC FA	NASA/ SS FA LILUR	/RI I AILUF E IN	EME	'A' (I)	N T	HE
MDM". I IOA DOES LOSS OF THE SECO REMAININ	CRI OND	OT EW SI	BEL: OR ' 'ATE	EVE VEHI VEC	CLE.	E L	oss In '	OF T THE	WOI WOI	ST. RST	ATE 'CASE	VE C	CTOR N EN	TRY,	T	ΗE	LO	SS O
IOA DOES RECOMMEN	NOS	TO DO	CON SWNG	CUR RADI	WIT	HAR	DWA	RE C	RI:								E.	IOA

NASA DATA:

ASSESSMENT DATE: 10/06/86

ASSESSMENT ID: NASA FMEA #:		В.	ASELINE [ X ] NEW [ ]					
SUBSYSTEM: MDAC ID: ITEM:	DPS 120 MDM FA1,FA2,FA3	, FA4						
LEAD ANALYST:	W. A. Haufler							
ASSESSMENT:								
CRITICAL: FLIGHT HDW/FUI		NCY SCREENS B C	CIL					
	] [ P ] ] [ P ]	[ P ] [ P	] [ X ] *					
COMPARE [ N /	] [ ]	] [ ]	] [N]					
RECOMMENDATIONS:	(If different	from NASA)						
[ 3 /1R	] [P]	[P] [P	] [D] (ADD/DELETE)					
* CIL RETENTION	RATIONALE: (If ap	AD	EQUATE [ X ] EQUATE [ ]					
REMARKS: SIMULTANEOUS DISSIMILAR FAILURES WERE EXCLUDED FROM THE IOA. MULTIPLE FAILURES ARE INCONSISTENT WITH THE NSTS 22206. IOA RECOMMENDS REPLACING THIS PHRASE IN THIS NASA/RI FMEA'S EFFECTS FIELD, "COUPLED WITH AN UNDETECTED FCS FAILURE (IN THE NULL POSITION)", WITH "COUPLED WITH A LIKE FAILURE IN ANOTHER MDM".								
IOA DOES NOT CONCUR WITH NASA'S REEVALUATION AND RATIONALE.  IOA RECOMMENDS DOWNGRADING THE HARDWARE CRITICALITY TO 3, THEREBY REMOVING THE FMEA FROM THE CIL.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-121 05-5-B03-1-1		NASA DATA: BASELINE NEW				
SUBSYSTEM: MDAC ID:	DPS 121 MDM FA1,FA2,FA						
LEAD ANALYST:	W. A. Haufler						
ASSESSMENT:							
CRITICALI FLIGHT HDW/FUN		ANCY SCREEN B		CIL ITEM			
·		_	_				
IOA [ 3 /IR	] [ P ] ] [ P ]	[P] [	Pj	[ ]			
COMPARE [ N /	] [ ]	[ ] [	]	[иј			
RECOMMENDATIONS: (If different from NASA)							
[ 3 /1R	] "[P]	[ P ] [	P ] (AI	[ D ] DD/DELETE)			
* CIL RETENTION F	RATIONALE: (If a		ADEQUATE NADEQUATE				
REMARKS: THIS FAILURE MODI BY THE ROCKWELL P PORT - SCU, MIA,	MEA WITH FAILUR	RE MODE "NO	OUTPUT: F	AILED MDM			
FAILURE". SIMULTANEOUS DISS MULTIPLE FAILURES IOA RECOMMENDS RI EFFECTS FIELD, "C NULL POSITION)", MDM". IOA DOES NOT CONC	S ARE INCONSIST EPLACING THIS P COUPLED WITH AN WITH "COUPLED W	ENT WITH TH HRASE IN TH UNDETECTED VITH A LIKE	IE NSTS 2220 IIS NASA/RI FOS FAILUF FAILURE IN	FMEA'S RE (IN THE ANOTHER			
IOA RECOMMENDS DO REMOVING THE FME	OWNGRADING THE I						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-122		NASA DATA: BASELINE NEW	[ X ]					
SUBSYSTEM: MDAC ID: ITEM:	DPS 122 MDM FA1,FA2,F	A3,FA4							
LEAD ANALYST:	W. A. Haufler	A. Haufler							
ASSESSMENT:									
CRITICAL: FLIGHT	TY REDUN			CIL ITEM					
HDW/FU	1C A	В	3						
NASA [ 2 /1R IOA [ 3 /1R	] [ P ] ] [ P ]	[P] [I	? ]	* [ X ]					
COMPARE [ N /	] [ ]	1 1	]	[ N ]					
RECOMMENDATIONS:	(If differe	nt from NASA)							
1 /	] [ ] .	ָר ז נ	] (AI	[ ] DD/DELETE)					
* CIL RETENTION 1	RATIONALE: (If	7	ADEQUATE						
INADEQUATE [ ] REMARKS: IOA DID NOT INITIALLY CONSIDER E/T SEP DOORS CLOSING PREMATURELY. IOA DOES CONCUR WITH NASA'S REEVALUATION AND RATIONALE. NO DIFFERENCES.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-123			NASA DATA: BASELINE [ X ] NEW [ ]			
SUBSYSTEM: MDAC ID: ITEM:	DPS 123 MDM FA1	,FA2,FA	3,FA4				
LEAD ANALYST:	W. A. Ha	ufler					
ASSESSMENT:			·				
CRITICAL FLIGH		REDUNDA	NCY SCREI	ens	CIL ITEM		
HDW/FU	_	A	В	С			
NASA [ 2 /lR IOA [ 3 /lR	] [	P ] P ]	[ P ] [ P ]	[ P ] [ P ]	[ X ] *		
COMPARE [ N /	] [	]	[ ]	[ ]	[ N ]		
RECOMMENDATIONS:	(If d	ifferent	t from NAS	5A)			
. [ /	] [	]	[ ]	[ ]	[ ] ADD/DELETE)		
* CIL RETENTION	RATIONALE	: (If a	pplicable	adequate Inadequate	[ X ]		
REMARKS: THIS FAILURE MOD COVERED BY THIS OUTPUT: ADDRESS MODULE SELECT FA IOA DOES CONCUR	E "ERRONI ROCKWELL CHECK FA ILURE".	EOUS OUT FMEA WI LILURE,	TPUT TO LI ITH FAILUI DATA ERRO	RU" IS CONSI RE MODE "ERR R TO MDM MO	ODULE, OR		

NO DIFFERENCES.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE NEW	[ ]		
SUBSYSTEM: MDAC ID: ITEM:	DPS 124 MDM FA1,FA2,FA3,F	' <b>A</b> 4			
LEAD ANALYST:	W. A. Haufler				
ASSESSMENT:					
CRITICAL:	TTY REDUNDANC	Y SCREENS	CIL ITEM		
HDW/FUI		ВС	IIIM		
NASA [ / IOA [ 3 / 1R	] [ ] [ [ P ] [	P ] [ P ]	[ ] * [ ]		
COMPARE [ N /N	] [ N ] [	и ј [и]	[ ]		
RECOMMENDATIONS:	(If different f	rom NASA)			
	] [ ] [	] [ ] (AI	[ ] DD/DELETE)		
* CIL RETENTION I	RATIONALE: (If app	ADEQUATE	į į		
INADEQUATE [ ]  REMARKS: ROCKWELL/NASA DID NOT COVER THIS FAILURE MODE. THIS FAILURE MODE, "PREMATURE OPERATION TO GPC", IS DETERMINED TO BE NON-CREDIBLE.					

ASSES ASSES NASA	SME	TK	ID	:	DP	DPS-125 NONE					BASELINE [ ] NEW [ ]								
SUBSY MDAC ITEM:	ID:				DP 12 MC	5	'A1,	FA2,1	FA3,I	FA4	,		Windows	, .,					
LEAD	ANA	LYS	T:		W.	A.	Hau	fler	7										
ASSES	SME	NT:																	
				CAL			F	EDUN	IDANO	CY	SC	REENS				CII			
				/FUI			7	7		В			С		7, 2	" <del>†</del> + <del>E</del>	ı.		
NA I	SA	]	3 ,	/ /1R	]		[ ]	, ] .	- [	P	]	]	p ]	-		[	]	*	
COMP	ARE	[	N	/N	]		[ ]	, ]	[	N	]		N ]			[	]		
RECOM	IMEN	[ADI	CIO	NS.:	,	(If	di	ffer	ent :	fro	om :	NASA)		-					
	,	[	,	/	]		[	Ĵ	<b>.</b>		]	[	3		(A	[ DD/I	) DELI	ETE)	
			TI	I NC	RAT	ION	ALE:	(If	app	1 i	.cal	ble) IN					-		
REMAR ROCKW THIS BE NO	ELL FAI	/NA LUR	E I	MOD:	D N E,	OT (	COVI	ER TH	HIS 1 OPER	FA]	LU	RE MC	DE.	٠.				NED	TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-126 05-5-B03-1-2		ATA: INE [ X ] NEW [ ]		
SUBSYSTEM: MDAC ID: ITEM:	DPS 126 MDM FA1,FA2,	,FA3,FA4			
LEAD ANALYST:	W. A. Haufle	r			
ASSESSMENT:					
CRITICAL: FLIGHT HDW/FUI	r	UNDANCY SCREENS B C	CIL ITEM		
NASA [ 2 /lR IOA [ 3 /lR	] [ P ]	[ P ] [ P ] [ P ]	[ X ] *		
COMPARE [ N /	] [ ]	[ ] [ ]	[ N ]		
RECOMMENDATIONS:	(If differ	rent from NASA)			
[ /	1 [ 1	[ ] [ ]	[ ] (ADD/DELETE)		
* CIL RETENTION	RATIONALE: (I	f applicable) ADEQUA INADEQUA			
REMARKS:  10A DID NOT INITIALLY CONSIDER E/T SEP DOORS CLOSING PREMATURELY 10A DOES CONCUR WITH NASA'S REEVALUATION AND RATIONALE. NO DIFFERENCES.					

ASSESSMENT I ASSESSMENT I NASA FMEA #:	DATE: 10/06, ID: DPS-12 : 05-5-1	/86 27 303-1-2			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	DPS 127	Al,FA2,FA3				
LEAD ANALYS	r: W. A.	Haufler				
ASSESSMENT:						
F	FICALITY FLIGHT DW/FUNC	REDUNDA A	NCY	SCREEN	s c	CIL ITEM
	•				•	
NASA [ 2 IOA [ 3	2 /1R ] 3 /1R ]	[ P ] [ P ]	[ P	] [	P] P]	[ X ] *
COMPARE [ ]	и / ј	[ ].	[	.] [	] .	[ N ]
RECOMMENDAT	IONS: (If	different	t fr	om NASA	)	·
[	/ ]	[ ]	[	] [	] (A:	[ ] DD/DELETE)
* CIL RETENT	TION RATION	ALE: (If a	ppl:	•	ADEQUATE NADEQUATE	
"ERRONEOUS C MODULE, OR	TO BE COVER: DUTPUT: ADD MODULE SELE INITIALLY ( NCUR WITH N.	ED BY THIS PRESS CHEC CT FAILUR CONSIDER I	S ROC K FA E". E/T S	CKWELL I LILURE, SEP DOO	FMEA WITH I DATA ERROP RS CLOSING	FAILURE MODE R TO MDM PREMATURELY.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-128 05-5-B03-1-1	NASA DATA: BASELINE [ X ] NEW [ ]
SUBSISIEM.	DPS 128 MDM FA1,FA2,FA3,	
LEAD ANALYST:	W. A. Haufler	
ASSESSMENT:		
CRITICALI FLIGHT	ITY REDUNDAN	NCY SCREENS CIL ITEM
HDW/FU	<del>-</del>	В С
NASA [ 2 /1R IOA [ 3 /1R	] [ P ] [ ] [ P ]	[P] [P] [X]* [P] [P] [,]
COMPARE [ N /	] [ ]	[ ] [ ] [ и ]
RECOMMENDATIONS:	(If different	from NASA)
[ 3 /1R	] [P] [	[P] [P] [] (ADD/DELETE)
* CIL RETENTION I	RATIONALE: (If ap	oplicable) ADEQUATE [ X ] INADEQUATE [ ]
BE COVERED BY THE FAILED MDM PORT-CARD/CHANNEL FAI SIMULTANEOUS DISEMULTIPLE FAILURE IOA RECOMMENDS REFFECTS FIELD, "ONLL POSITION)", MDM."	IS ROCKWELL FMEA SCU, MIA, A/D, PO LURE". SIMILAR FAILURES ARE INCONSISTED EPLACING THIS PHICOUPLED WITH AN UWITH "COUPLED WI	ON BUSY MODE" IS CONSIDERED TO WITH FAILURE MODE "NO OUTPUT: OWER SUPPLIES, OR I/O  WERE EXCLUDED FROM THE IOA. NT WITH THE NSTS 22206.  RASE IN THIS NASA/RI FMEA'S UNDETECTED FCS FAILURE (IN THE ITH A LIKE FAILURE IN ANOTHER REEVALUATION AND RATIONALE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-140 05-5-B03		NASA DAT BASELIN NE	E [ X ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 140 MDM PF1	,PF2		
LEAD ANALYST:	W. A. Ha	ufler		
ASSESSMENT:				
CRITICALI FLIGHT		REDUNDANCY	SCREENS	CIL ITEM
HDW/FUN		A B	C	
NASA [ 2 /lR IOA [ 3 /lR	] [	P ] [ P [ P	] [P]	[ X ] *
COMPARE [ N /	] [	] [	] [ ]	[и]
RECOMMENDATIONS:	(If di	ifferent from	om NASA)	
[ /	] [	] [	] [ ] (2	ADD/DELETE)
* CIL RETENTION R	ATIONALE	: (If appl:		en e
			ADEQUATE INADEQUATE	[ X ] [ ]
REMARKS: IOA DID NOT INITI COMMAND.			· · · · · · · · · · · · · · · · · · ·	
IOA DOES CONCUR V NO DIFFERENCES.	VITH NASA	A-S KEEVALU	ATION AND KATION	ALE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				NASA DAT BASELIN NE	
SUBSYSTEM:	DPS 141 MDM PF1				
LEAD ANALYST:	W. A. H	aufler			
ASSESSMENT:					
CRITICAL: FLIGH		REDUND	ANCY SCRE	ENS	CIL ITEM
HDW/FU		A	В	С	
NASA [ 2 /1R IOA [ 3 /1R	] [	P ] P ]	[ P ] [ P ]	[ P ] [ P ]	[ X ] *
COMPARE [ N /	] [	. ]	[ .]	[ ]	[ N ]
RECOMMENDATIONS:	(If d	ifferen	t from NA	SA)	·
. [ /	] [	]	[ ]	[ / ] (	[ ADD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	applicabl	e) ADEQUATE INADEQUATE	
REMARKS: THIS FAILURE MOD COVERED BY THIS FAILED MDM PORT- CARD/CHANNEL FAI	ROCKWELL SCU, MIA	FMEA W	ITH FAILU	RE MODE "NO	OUTPUT:
IOA DID NOT INIT COMMAND. IOA DOES CONCUR	IALLY CO				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-142	0	SA DATA: ASELINE [ X ] NEW [ ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 142 MDM PF1,PF2		
LEAD ANALYST:	W. A. Haufler		
ASSESSMENT:			
CRITICAL FLIGH	ITY REDUND	ANCY SCREENS	CIL
HDW/FU		в с	IIBN
NASA [ 2 /1R IOA [ 3 /1R	] [ P ] ] [ P ]	[P] [P]	[ X ] * [ ] _
COMPARE [ N /	1 [ -1		[ <b>N</b> ] ->
RECOMMENDATIONS:	(If differen	t from NASA)	· · · · · · · · · · · · · · · · · ·
[ /	נ נ נ	[ ] [ ]	[ ] (ADD/DELETE)
* CIL RETENTION I	RATIONALE: (If a	ADE	QUATE [ X ]
REMARKS: IOA DID NOT INIT! DOOR'S LATCH TO IOA DOES CONCUR! NO DIFFERENCES.	UNLATCH.	INADVERTENT COM	MAND TO PAYLOAD BAY

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		5 <b>-</b> 2		ASA DATA: BASELINE NEW	[ X ]
MDAC ID:	DPS 143 MDM PF1,P1	F2			
LEAD ANALYST:	W. A. Haus	fler			
ASSESSMENT:					
CRITICAL FLIGH		EDUNDANCY	SCREENS	4.	CIL ITEM
HDW/FU		В	C	!	112
NASA [ 2 /lR IOA [ 3 /lR	] [ P	] [ P ] .[ P	] [ F	) ]	[ X ] * ·
COMPARE [ N /	] [	] [	] [	J	[ N ]
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)		
1	] [	] [-	] [	] (A)	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appli		DEQUATE	[ ] ·
REMARKS: THIS FAILURE MOD COVERED BY THIS OUTPUT: ADDRESS MODULE SELECT FA IOA DID NOT INIT DOOR'S LATCH TO IOA DOES CONCUR NO DIFFERENCES.	ROCKWELL F CHECK FAI LILURE". IALLY CONS UNLATCH.	MEA WITH I LURE, DATA IDER INADV	TO LRU" FAILURE M ERROR T	IS CONSII  MODE "ERRO  MOM MO  COMMAND TO	DERED TO BE ONEOUS DULE, OR O PAYLOAD BAY

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			NASA DATA BASELINE NEW	[ ]
	DPS 144 MDM PF1,PF	2		
LEAD ANALYST:	W. A. Hauf	ler		
ASSESSMENT:				
CRITICAL: FLIGHT		DUNDANCY SCR	EENS	CIL ITEM
HDW/FUI	==	В	С	ITEM
NASA [ / IOA [ 3 / 1R	] ] [ P	] [ ] ] [ P ]	[ ] [ P ]	*. [ · ]
COMPARE [ N /N	] · [N	] [N]	[ .N ]	[ ]
RECOMMENDATIONS:	(If diff	erent from N	ASA)	
[ /	] [	ן נ	[ ] (A	[ ] DD/DELETE)
* CIL RETENTION I	RATIONALE:	(If applicab	le) ADEQUATE INADEQUATE	
REMARKS: ROCKWELL/NASA DII THIS FAILURE MODI BE NON-CREDIBLE.	NOT COVER E, "PREMATU	THIS FAILUR	E MODE.	DETERMINED TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-145 NONE	1	NASA DATA BASELINE NEW	[	]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 145 MDM PF1,PF2					
LEAD ANALYST:	W. A. Haufler					
ASSESSMENT:						
CRITICAL: FLIGH		DANCY SCREENS		CIL	ĭ	
HDW/FU		В	2		•	
NASA [ / IOA [ 3 / 1R	] [ ] ] ]	[ P ] [ 1	] P ]	[ .	] <b>*</b> ].	
COMPARE [ N /N	) [N]	[ 14 ]	1 ]		3	
RECOMMENDATIONS:	(If differe	nt from NASA)				
	] [ ]	[ ] [	] (A	[ DD/DI	] ELETE)	
* CIL RETENTION	RATIONALE: (If		ADEQUATE	[	]	
REMARKS: ROCKWELL/NASA DID NOT COVER THIS FAILURE MODE. THIS FAILURE MODE, "PREMATURE OPERATION TO LRU", IS DETERMINED TO BE NON-CREDIBLE.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-146		NASA DATA: BASELINE [ X ] NEW [ ]							
SUBSYSTEM: MDAC ID: ITEM:	DPS 146 MDM PF1,	PF2								
LEAD ANALYST:	W. A. Ha	ufler								
ASSESSMENT:										
CRITICAL: FLIGHT		REDUNDANCY	SCREENS		CIL					
HDW/FUI		A B	С		TIEM					
NASA [ 2 /lR IOA [ 3 /lR	] [	P ] [ P P ]	] [ P ] [ P		[ X ] * ] * ]					
COMPARE [N/	] [	J [	J [	1 .	[иј					
RECOMMENDATIONS:	(If di	fferent fr	om NASA)							
[ /	] [	] [	j [	] (AI	[ ] DD/DELETE)					
* CIL RETENTION I	RATIONALE	: (If appl:								
		-		DEQUATE DEQUATE						
REMARKS: IOA DID NOT INIT: DOOR'S LATCH TO IOA DOES CONCUR INO NO DIFFERENCES.	UNLATCH.	•								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-147 05-5-B03	6 3 <b>-</b> 5-2	NASA DATA BASELINE NEW			
SUBSYSTEM: MDAC ID:	DPS 147 MDM PF1,					
LEAD ANALYST:	W. A. Ha	aufler				
ASSESSMENT:						
CRITICAL: FLIGHT		REDUNDANCY S	SCREENS	CIL ITEM		
HDW/FU		A B	С			
NASA [ 2 /lR IOA [ 3 /lR	] [	P ] · .[ P ]	] [P] ] [P]	[ X ] *		
COMPARE [ N /	] [	] [	נ ז	[ N ]		
RECOMMENDATIONS:	(If d	ifferent from	m NASA)			
. 1	] [	נ :	] [ ] . (A)	[ ] DD/DELETE)		
* CIL RETENTION I	RATIONALI	E: (If applio	cable) ADEQUATE INADEQUATE	[ x ]		
THIS FAILURE MOD CONSIDERED TO BE "ERRONEOUS OUTPUT	COVERED ADDRE	BY THIS ROCE	KWELL FMEA WITH	FAILURE MODE		
MODULE, OR MODULION DID NOT INITED DOOR'S LATCH TO	IALLY CON UNLATCH.	NSIDER INADV				
IOA DOES CONCUR	WITH NAS.	A'S REEVALUA	TION AND RATIONA	• کلیان		

NO DIFFERENCES.

ASSESSMEN ASSESSMEN NASA FMEA	NT DATE NT ID: A #:	: 10/0 DPS- 05-5	6/86 148 -B03-5	-1			A DATA SELINE NEW			
SUBSYSTEN MDAC ID: ITEM:	1:	148	PF1,PF				÷ .			
LEAD ANAI	LYST:	W. A	. Hauf	ler					-	=
ASSESSMEN	T:									
C	RITICA FLIG HDW/F	HT	RE:	DUNDANC	EY SCRI	EENS C		CIL ITEM		
NASA IOA	[ 2 /1 [ 3 /1	R]. R]	. [ P	] [	P ] P ]	[ P ]		x ]	] * .	
COMPARE "	N/	3	[	) . [	]	[ ]		[ N	]	est a Si
RECOMMENI	DATIONS	: (I	f diff	erent i	from NA	ASA)	· -			
	[ /	]	[ ]	] [	]	[ ]	(Al	[ DD/DE		
* CIL REI	ENTION	RATIO	NALE:	(If app	licabl	Le)		r Wilder - E		- "".
							QUATE QUATE			
REMARKS: THIS FAIL BE COVERE FAILED MI CARD/CHAI IOA DID N IOA DOES A SECOND FOR WORST NO DIFFEI	ED BY TO DM PORT NNEL FA NOT COVE CONCUR MDM FA	HIS ROO - SCU ILURE" ER THI: WITH ILURE	CKWELL, MIA,  FAILUMASA'S WOULD	FMEA V A/D, I JRE MOI REEVAI REQUIRI	NITH FA	AILURE SUPPLIE: THE ORI N AND R	MODE " S, OR I GINAL . ATIONA	NO OU I/O ANALY LE.	TPUT:	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				10/06/86 DPS-180 05-5-B03-4-1						NASA DATA BASELINE NEW					NE		x	]			
	SYSTEI C ID: M:	M:			DP 18 MD		Fl,	, I	LAl												
LEAI	D ANA	LYS	T:		w.	A.	На	uf	ler												
ASSI	ESSME	NT:																			
	(		FL	CALI					EDUN	DAN		SCI	REEN					CI	IL EM	I	
		H	DW	/FUI	1C			A			В			С							
-	NASA IOA	[	3 3	/2R /2R	]		]	P P	]	[	N N	A] A]	[	P P	]			[		]	*
COM	PARE	[		/	]	*	[		]	l	•	]	[	• .	]			[		]	
REC	OMMEN	'DA'	ric	ons:		(If	d:	if	fere	nt	fr	om 1	NAS <i>i</i>	<b>/</b> /							
		[		/	3		[		]	[		]			J		(AI	[ OD/	/DI	] ELE	ETE)
* C	IL RE	ren	TI	ON I	TAS	ION	ALI	E:	(If	ap	pl	icāl		A	DEQ DEQ			[		]	
REMA	ARKS:							•					_					L		J	

NO DIFFERENCES.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DDC_101	NASA DATA BASELINI NEV	
	DPS 181 MDM LF1,LA1		
LEAD ANALYST:	W. A. Haufler		-
ASSESSMENT:			
FLIGHT			CIL ITEM
HDW/FUN	IC A	ВС	
NASA [ 3 /2R IOA [ 3 /2R	] [ P ] [	NA] [P]	[ ] *
COMPARE [ /	j [ ] [	[ ] [ ]	[ ]
RECOMMENDATIONS:	(If different	from NASA)	
t /	] [ ] [	[ ] [ ]	[ ] ADD/DELETE)
* CIL RETENTION F	ATIONALE: (If ap	plicable) ADEQUATE INADEQUATE	[ ]
COVERED BY THIS F	ROCKWELL FMEA WIT - SCU, MIA, A/D,	T TO LRU" IS CONSIDE TH FAILURE MODE "NO POWER SUPPLIES, OR	ERED TO BE OUTPUT:

ASSESSME ASSESSME NASA FME	NT I	D:	DPS	'06/ -18: 5-B	2	4-2			1		DATA ELINE NEW	[ ]	K ]
SUBSYSTE MDAC ID: ITEM:			DPS 182 MDM		1,L	Al							
LEAD ANA	LYSI	<b>!:</b>	w.	A. I	lau	fler			-				
ASSESSME	NT:												
	F	ICAL LIGH W/FU	T		R: A			SCR	REENS	2		CII	
NASA IOA	[ 3	•			[ P	]	[ ]	NA] NA]	[ ] [ ]	P ]		[ ]	] *
COMPARE	[	/	]		[	)	[	]	[	]		[	]
RECOMMEN	VDAT:	cons:	(	(If	dif	fere	ent f	rom N	NASA)				
		/	]	-	[	]	[	]	[ .	]	(A		] DELÉTE)
* CIL RE			RATI	ONA	LE:	(If	appl	licab	7		UATE UATE	[	]

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-183 05-5-B03-4-2		EELINE [ X ] NEW [ ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 183 MDM LF1,LA1		No es
LEAD ANALYST:	W. A. Haufler		
ASSESSMENT:			
CRITICAI FLIGH HDW/FU	T	DANCY SCREENS B C	CIL
NASA [ 3 /2R IOA [ 3 /2R		[ NA] [ P ] [ NA]	[ ] ****
COMPARE [ /	] [ ]	[ ] [ ]	נ ז
RECOMMENDATIONS:	(If differen	nt from NASA)	· · · · · · · · · · · · · · · · · · ·
[ /	] [ ]	[ ] [ ]	[ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If		UATE [ ]
COVERED BY THIS		UTPUT TO LRU" IS WITH FAILURE MODE	CONSIDERED TO BE E "ERRONEOUS

	DPS-184	BASELINE NEW	
	DPS 184 MDM LF1,LA1		
LEAD ANALYST:	W. A. Haufler		
ASSESSMENT:			
CRITICALI FLIGHT	ITY REDUNDANCY SCREI	ens	CIL ITEM
HDW/FUN	NC A B	С	
NASA [ / IOA [ 3 /2R	] [ ] [ ] ] [ P ] [ NA]	[ ] ·	[ ] *
COMPARE [ N /N	[и] [и]	[ N ]	[ ]
RECOMMENDATIONS:	(If different from NA	SA)	
[ /	] [ ] [ ]	[ ] (AI	[ ] DD/DELETE) .
* CIL RETENTION F	RATIONALE: (If applicable	e) ADEQUATE INADEQUATE	. ]
REMARKS: ROCKWELL/NASA DII THIS FAILURE MODI BE NON-CREDIBLE.	D NOT COVER THIS FAILURE E, "PREMATURE OPERATION '	MODE.	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 10/06/8 DPS-185 NONE			NASA DATA BASELINE NEW	[ ]	rund Edit Ala
SUBSYSTEM: MDAC ID: ITEM:	DPS 185 MDM LF1	,LAl				
LEAD ANALYST:	W. A. H	aufler				
ASSESSMENT:						
CRITICAL		REDUNDAN	CY SCREE	ens	CIL ITEM	j.
FLIGH HDW/FT		A	В	С	TTEM	
NASA [ / IOA [ 3 /2]	] [	P ]. [	NA]	[ ] [ P ]	[ ]	** =
COMPARE [ N /N	] [	и] [и	ו א	[ N ]	[ ]	
RECOMMENDATIONS	: (If d	ifferent	from NAS	5 <b>A)</b> 9	,	
[- /	) [	] [	]	[ ] <b>A</b> )	[ ]	ETE)
* CIL RETENTION	RATIONAL	E: (If apr		ADEQUATE	[ ]	
REMARKS: ROCKWELL/NASA DI					DETEDM:	TNED TO

BE NON-CREDIBLE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-186 05-5-B03-	4-2		NASA DAT BASELIN NE	1E [ X	]
SUBSYSTEM: MDAC ID: ITEM:	DPS 186 MDM LF1,L	Al				
LEAD ANALYST:	W. A. Hau	fler				
ASSESSMENT:						
CRITICAL FLIGH HDW/FU	T	EDUNDANC	Y SCREEN	rs C	CIL	
nDW/ FO	NC A	,	<i>B</i>			
NASA [ 3 /2R IOA [ 3 /2R	[ P	] [	NA] [ NA] [	[ P ] [ P ] .	[ [	] * ]
COMPARE [ /	) [	] [	]	[ ]	[	]
RECOMMENDATIONS:	(If dif	ferent i	rom NAS	<b>A</b> )		
[ /	) [	1 [	] [	. ]	[ (ADD/D	] ELETE
* CIL RETENTION REMARKS:	RATIONALE:	(If app		ADEQUATI		]
NO DIFFERENCES.					,	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-187 05-5-B03-4-2	NASA DATA: BASELINE [ X ] NEW [ ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 187 MDM LF1,LA1	
LEAD ANALYST:	W. A. Haufler	
ASSESSMENT:		
CRITICAL FLIGHT	ITY REDUNDANCY SCREENS	CIL ITEM
HDW/FUI		C
NASA [ 3 /2R IOA [ 3 /2R	] [P] [NA] [ ]	P ] [ ] * · · · P ] [ ]
COMPARE [ /	1	j [ ]
RECOMMENDATIONS:	(If different from NASA)	
[ /	1 [ 1 [ 1 [	] [ ] (ADD/DELETE)
* CIL RETENTION I		ADEQUATE [ ] ADEQUATE [ ]
BE COVERED BY TH	E "STUCK ON A CONSTANT OUTP IS ROCKWELL FMEA WITH FAILU CHANNEL".	UT" IS CONSIDERED TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DDC-100			NASA DATA BASELINE NEW	
MDAC ID:	DPS 188 MDM LF1,	,LAl			
LEAD ANALYST:	W. A. Ha	ufler			
ASSESSMENT:					
CRITICALI FLIGHT		REDUNDA	NCY SCREE	NS	CIL ITEM
HDW/FUN		A	В	С	
NASA [ 3 /2R IOA [ 3 /2R	] [	P ] P ]	[ NA ] [ AN ]	[ P ] [ P ]	[ ] *
COMPARE [ /	ן נ	1	[ ]	[ ]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)	
[ /	J [	]	į j	[ ] (A	[ ] .DD/DELETE)
* CIL RETENTION I	RATIONALI	E: (If a	pplicable		
				ADEQUATE INADEQUATE	[ ]
REMARKS: THIS FAILURE MODE BE COVERED BY THE MDM FAILED PORT NO DIFFERENCES.	IS ROCKW	ELL FME	WITH FA	LURE MODE '	'NO OUTPUT:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-190		NASA DATA: BASELINE [ ] NEW [ X ]			
SUBSYSTEM: MDAC ID: ITEM:	DPS 190 RESISTOR	R, CURRENT	LIMITING			
LEAD ANALYST:	W. A. H	AUFLER				
ASSESSMENT:						
CRITICAL FLIGH HDW/FU	r	REDUNDANCY A B	SCREENS	CIL ITEM		
NASA [ 3 /lR IOA [ 3 /lR		P ] [ F P ]	•	[ X ] *		
		) [	נ ז נ	[ N ]		
RECOMMENDATIONS:	(If d	ifferent fro	om NASA)			
[ /	ן נ	j (	1 [ ]	[ ] (ADD/DELETE)		
* CIL RETENTION	RATIONALE	E: (If appli	.cable) ADEQUA' INADEQUA'			
REMARKS: THE IOA DID NOT THE IOA DOES CON THE CIL RETENTION AVAILABLE.	CUR WITH	NASA'S REEV	THE ORIGINAL A	NALYSIS.		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/15/86 DPS-191 05-6S-BRP	PC3-1		ASA DATA BASELINE NEW	[ ]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 191 CONTROLLE	R, REMOTE	POWER			
LEAD ANALYST:	W. A. HAU	FLER				
ASSESSMENT:						
CRITICAL: FLIGHT		EDUNDANCY	SCREENS		CIL ITEM	
HDW/FUI	NC A	В	C			
NASA [ 3 /lR IOA [ 3 /lR	] [ P	[ F	] [ P	]	[ X ] *	
COMPARE [ /	j [	] [	] [	3	[. ]	
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)			
1	) [	J [	] [	] (A	[ ] DD/DELETE)	
* CIL RETENTION I	RATIONALE:	(If appl:				
		•		DEQUATE DEQUATE	[ ] [X]	
REMARKS: THE IOA DID NOT	COVER THIS	ITEM IN	THE ORIGI	NAL ANAI	YSIS.	
THE IOA DID NOT COVER THIS ITEM IN THE ORIGINAL ANALYSIS.  THE IOA DOES CONCUR WITH NASA'S REEVALUATION.  THE CIL RETENTION RATIONALE IS INADEQUATE BECAUSE IT IS NOT YET AVAILABLE.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/15/86 DPS-192 05-6S-BRPC3	-2	NASA DATA: BASELINE NEW	[ X ]
MDAC ID:	DPS 192 CONTROLLER,	REMOTE POWER		
LEAD ANALYST:	W. A. HAUFL	ER		
ASSESSMENT:				
FLIGHT		UNDANCY SCREENS B		CIL ITEM
			_	
NASA [ 3 /3 IOA [ 3 /3	] [ P ] ] [ NA]	[ NA] [ NA ] [ NA ]	P] NA]	[ ] *
COMPARE [ /	ן א ן	[ ] [1	N ]	[ ]
RECOMMENDATIONS:	(If diffe	rent from NASA)		
( /	] [ ]	[ ] [	] (AD)	[ ] D/DELETE)
* CIL RETENTION F	PATTONALE: (1	If annlicable)		The court
		INA	ADEQUATE	[ ] ·
REMARKS: THE IOA DID NOT		TEM IN THE ORIG	INAL ANALY	
THE IOA DOES CONG ACCORDING TO NSTS FOR FMEAS WITH A	22206, REDI	UNDANCY SCREENS		NA" OR BLANK

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/15/86 DPS-193 05-6S-BSW3	3-1		NASA DATA BASELINE NEW	[ ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 193 SWITCH, MI	DM POWER			
LEAD ANALYST:	W. A. HAU	FLER			
ASSESSMENT:					
CRITICALI FLIGHT	r	EDUNDANCY			CIL ITEM
HDW/FUN	NC A	, <b>B</b>		C	
NASA [ 3 /1R IOA [ 3 /1R	] [ P ] [ P	] [ F	] [	P ] P ]	[ X ] * [ X ]
COMPARE [ /	] [	] [	] [	1 ,	[ ]
RECOMMENDATIONS:	(If dif	ferent fr	om. NASA)		
[ /	1	] [	J [	] (A	[ ] DD/DELETE)
* CIL RETENTION I	RATIONALE:	(If appl		ADEQUATE IADEQUATE	[ x ]
REMARKS: THE IOA DID NOT O THE IOA DOES CONO THE CIL RETENTION AVAILABLE.	CUR WITH N	IASA'S REE	VALUATIO	on.	1
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and the control of th	the state of the s		. 1		
ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DDC 104		NASA DATA BASELINE NEW		] .
SUBSYSTEM: MDAC ID: ITEM:	DPS 194 SWITCH, MDM PO	WER	the transfer of the same		
LEAD ANALYST:	W. A. HAUFLER				
ASSESSMENT:					
CRITICAL: FLIGHT	r	ANCY SCREEN		CIL	
HDW/FUI	NC A	В	С		
NASA [ 3 /3 IOA [ 3 /3	] [ P ] ] [ NA]	[ NA ] [ [ NA ]	P ] NA]	[	] *
COMPARE [ /	] [ N ]	[ ] [	ן א	[.	]
RECOMMENDATIONS:	(If differen	nt from NASA	.)		
\ 1	] [ ] .	[ ] [	] (A)	[ DD/DI	] ELETE)
* CIL RETENTION I	RATIONALE: (If	applicable)	:	<u>I</u>	
			ADEQUATE NADEQUATE	[	]
REMARKS: THE IOA DID NOT ( ACCORDING TO NSTS	OVER THIS ITEM	IN THE ORI	GINAL ANAL	YSIS	OR BLANK
FOR FMEAS WITH A NASA AGREED WITH	CRITICALITY OF	7 3/3.	<del></del>	******	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/15/86 DPS-195 05-6S-BSW	5 <b>-</b> 3	A: E [ ] V [ X ]				
SUBSYSTEM: MDAC ID: ITEM:	DPS 195 SWITCH, M	DM POWER					
LEAD ANALYST:	W. A. HAU	FLER					
ASSESSMENT:							
CRITICAL FLIGH		EDUNDANCY SO	CREENS	CIL ITEM			
HDW/FU	NC A	В	С				
NASA [ 3 /1R IOA [ 3 /1R	] [ P	[ F ] [ F ]	[ P ] [ P ]	[ X ] *			
COMPARE [ /	]. [	] [ ]	[ ]	[ N ]			
RECOMMENDATIONS:	(If dif	ferent from	NASA)				
[ /	] [	1 . [ ]	[ ] (2	[ ] ADD/DELETE)			
* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ X ]						
REMARKS: THE IOA DID NOT THE IOA DOES CON THE CIL RETENTIO	CUR WITH 1	NASA'S REEVA	LUATION.	LYSIS.			
AVAILABLE.							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		4	NASA DATA: BASELINE [ X ] NEW [ ]	-				
	DPS 201 Input/Output Pr		<del>)</del>	FĘ.				
LEAD ANALYST:	T. B. Cribbs							
ASSESSMENT:								
CRITICALI FLIGHT	TY REDUNDA	NCY SCREENS	CIL ITEM					
HDW/FUN	IC A	ВС	,					
NASA [ 2 /1R IOA [ 3 /1R	[ P ] ] [ P ]	[ P ] [ P [ P ] [ P	? ]					
COMPARE [ N /	] [ ]	[ ] [	] [ N ]					
RECOMMENDATIONS:	(If different	from NASA)						
		1 [ ]	[ ] (ADD/DELETE)					
* CIL RETENTION F	ATIONALE: (If a	A	DEQUATE [ X ]					
REMARKS: SIMULTANEOUS DISSIMILAR FAILURES WERE EXCLUDED FROM THE IOA. MULTIPLE FAILURES ARE INCONSISTENT WITH THE NSTS 22206. NASA'S FAILURE EFFECTS COUPLED THIS FAILURE WITH AN UNDETECTED FLIGHT CONTROL SYSTEM FAILURE. THIS COULD RESULT IN TWO HEALTHY PATHS BEING VOTED OUT. THIS COULD POSSIBLY CAUSE LOSS OF VEHICLE. IOA RECOMMENDS CHANGING THE EFFECTS TO DELETE THE SENTENCE "DURING ASCENT/ENTRY, THIS". IOA DOES CONCUR WITH THE REST OF NASA'S REEVALUATION AND RATIONALE.								

	ASSESSMEN ASSESSMEN NASA FMEA	T ID:	10/06 DPS-2 05-5-	02	1-2				ASA DAT BASELIN NE	E [ X	; ] ]
	SUBSYSTEM MDAC ID: ITEM:	:	DPS 202 Input	/Out	put 1	Proces	ssor	(IOP	)		
	LEAD ANAL	YST:	T. B.	Cril	obs						
	ASSESSMEN	T:									
	C	RITICAL: FLIGHT HDW/FUI	r	RI A	EDUNI	DANCY B	SCRE	ENS C		CIL	
	NASA IOA	[ 3 /lR [ 3 /lR	]	[ P	]	[ P	]	[ P	]	[	] .* ]
	COMPARE	[ /	]	[	<b>]</b>		]	[	]	[	]
	RECOMMENI	ATIONS:	(If	dif	fere	nt fro	om NA	SA)			
		[ /	]	[	]	[	] ·	[	] (	[ ADD/D	] ELETE
-	* CIL RET	ENTION 1	RATION	ALE:	(If	appli	cabl	A	DEQUATE DEQUATE		]
	NO DIFFER	ENCES I	N ANAI	YSIS	RES	ULTS.	-				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-203 NONE		ASA DATA: BASELINE [ NEW [	]
SUBSYSTEM: MDAC ID: ITEM:	DPS 203 Input/Output Pro	cessor (IOP	<b>)</b>	
LEAD ANALYST:	T. B. Cribbs			
ASSESSMENT:				
CRITICAL: FLIGHT		CY SCREENS		CIL TEM
HDW/FUI		в с		·
NASA [ / IOA [ 3 /1R	] [ p ] [	P ] [ P	] [	] * <u>in</u>
COMPARE [ N /N	] [N] [	и ] [и	] [	]
RECOMMENDATIONS:	(If different	from NASA)	·	
1 /	ז נ ז נ	]	] [ADD	] D/DELETE)
* CIL RETENTION I	RATIONALE: (If app	Aİ	EQUATE [	j ·
REMARKS: NASA/RI DID NOT O THE FAILURE MODE	COVER THIS FAILUR AND EFFECTS ARE	E MODE OF P		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-204 05-5-B02-1-2		NASA DATA BASELINE NEW	[ X ]			
SUBSYSTEM: MDAC ID: ITEM:	DPS 204 Input/Output	: Processor (l	(OP)				
LEAD ANALYST:	T. B. Cribbs	ļ					
ASSESSMENT:							
CRITICAL: FLIGHT HDW/FUI	r	NDANCY SCREEN B	rs C	CIL ITEM			
NASA [ 3 /lR IOA [ 3 /lR		[ P ] [	P ] . P ]	[ ] *			
COMPARE [ /	] [ ]	ו נון	[ ]	[ ]			
RECOMMENDATIONS:	(If differ	rent from NASA	<b>A</b> )				
[ /	] [ ]	[ ] [		[ ] DD/DELETE)			
* CIL RETENTION I	RATIONALE: (I	•••	ADEQUATE NADEQUATE	[ ]			
REMARKS: NO DIFFERENCE. FAILURE MODE'S EFFECT COULD HAVE BEEN CONSIDERED IN ROCKWELL'S 05-5 -B02-1-2. IOA'S FAILURE MODE ANALYSIS DID NOT CHANGE CRITICALITY OF FUNCTION.							

ASSESSMENT ASSESSMENT NASA FMEA	DATE: ID: #:	10/06/ DPS-20 05-5-E	/86 5 301-1-	-1		NASA DATA: BASELINE [ X ] NEW [ ]		
SUBSYSTEM: MDAC ID: ITEM:		205		ocessi		t (CPU)	•	
LEAD ANALYS	ST:	T. B.	Cribb	os				
ASSESSMENT	:							
CR	ITICAL FLIGH	ITY	REI	OUNDANC	Y SCRE	ENS	CIL ITEM	
I	HDW/FU		A		В	С	71411	
NASA [ ] AOI	2 /1R 3 /1R	]	[ P ]	] [	P ] . P ]	[ P ]	[ X ] *	
COMPARE [	N /	] .	[.	] [	]	[ ]	[ N ]	
RECOMMENDA	TIONS:	(If	diff	erent f	rom NA	ASA)		
1	/	]	[ ]	] [	1	[ ]	[ ] (ADD/DELET	E)
* CIL RETER	NTION I	RATIONA	LE: (	(If app	licabl		ATE [ X ] ATE [ ]	
MULTIPLE FOR NASA CONSIDERATION OF THE PROPERTY OF THE PROPERT	AILURE DERED O Y FOR COMMEN CENT/E	S ARE TONE GPO THIS FN DS CHAI ENTRY,	INCONS AND IEA. IGING THIS.	SISTENT ONE FO THE EI	WITH S FAIL FECTS	THE NSTS URE IN A TO DELET	SSIGNING THE E THE SENTEN	IR

ASSESSME ASSESSME NASA FME	NT II		DP	/06, 5-2( -5-1	06		-2							ASE	LI		[	x	]	
SUBSYSTE MDAC ID:			DPS 200 Ce	_	al	Pı	roce	255	ing	Ur	nit	((	CPU	T)						
LEAD ANA	LYST:	:	T.	в.	Cr	ib	bs													
ASSESSME	NT:																			
		LIGH!	r			RE A	DUN	[DA]	NCY B	sc	REE	:NS	s c					[L	I	
		/FU					•													
NASA IOA	[ 3 [ 3	/1R /1R	]		[	P P	]		[ P [ P	]		[	P	] .]			[		]	*
COMPARE	Ţ	/	]		[		]		<b>.</b> [ ,	]		[		]			<b>[</b>		]	
RECOMMEN	IDATI	ons:		(If	đ:	if1	fere	ent	fr	om.	NAS	SA)	)							
	Ţ	/	]		[		]		[	]		[		] -		(Al	[ DD/	/DI	] ELI	ETE
* CIL RE	TENT	ION :	RAT	ION	ALE	E:	(If	aj	pp1	ica	ble			EQU			[		]	
REMARKS:								•					٠.							

NO DIFFERENCES

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-207			NASA DATA BASELINE NEW		]
	207	Processi	ing Unit (	(CPU)		
LEAD ANALYST:	T. B. Cr	ribbs				
ASSESSMENT:						
CRITICALI FLIGHT		REDUNDAN	CY SCREEN	'S	CIL ITEM	
	īC	A	В	С	TIEM	
NASA [ / IOA [ 3 / 1R	] [	P ] [	P ] [	P ]	[	] *
COMPARE [ N /N	] [	и ] [	[ N ]	N ]	[	]
RECOMMENDATIONS:	(If di	ifferent	from NASA	7)		
1 1	) [	נ נ	) [	] (Al	[ DD/DE	] LETE)
* CIL RETENTION F	RATIONALE	E: (If ap	plicable)		· in	
			Ì	ADEQUATE NADEQUATE		] -
REMARKS: IOA DOES CONCUR THE IOA DOES NOT CRITICALITY OF TH	WITH NAS	ND THAT A	NEW FME	A BE WRITTE BY THE FA	N, SI ILURE	NCE THE MODE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-208 NONE		ASA DATA: BASELINE [ X ] NEW [ ]				
SUBSYSTEM: MDAC ID: ITEM:	DPS 208 Central Proces	ssing Unit (CF	U)				
LEAD ANALYST:	T. B. Cribbs						
ASSESSMENT:							
CRITICAL FLIGH HDW/FU	r	ANCY SCREENS B C	CIL				
NASA [ ./ IOA [ 2 /lR	] [ p ]	[ P ] [ P	] [ ] *				
COMPARE [ N /N	] [N]-	[ N ] [ N	] [ ]				
RECOMMENDATIONS:	(If differer	nt from NASA)					
[ /	] [ ]	[ ] [	] [ ] (ADD/DELETE)				
* CIL RETENTION REMARKS:	·	ANI	DEQUATE [ ] DEQUATE [ ]				
THE FAILURE MODE AND EFFECTS ARE DETERMINED TO BE NON-CREDIBLE.							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-209 NONE	NASA DATA BASELINE NEW	[ ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 209 CPU Power Switch		
LEAD ANALYST:	T. B. Cribbs		
ASSESSMENT:			<u> </u>
CRITICALI FLIGHT HDW/FUN	ר	NS C	CIL ITEM
NASA [ / IOA [ 3 /3	] [ ] [ ] [ ] [ [ NA ]	[ NA]	[ ] *
COMPARE [ N /N		[ א ]	[ ]
RECOMMENDATIONS:	(If different from NAS	A)	
t /	j. [ ] [ ]	[ ]	[ DD/DELETE)
	RATIONALE: (If applicable)	ADEQUATE INADEQUATE	
BEFORE THE CRITIC SECOND FAILURES A CRITICALITY.	E WOULD REQUIRE A SECOND I CALITY OF THE POWER SWITC ARE NOT ANALYZED TO ESTABI E AND EFFECTS ARE DETERMI	H COULD BE T LISH FUNCTION	JPGRADED. NAL
	· · · · · · · · · · · · · · · · · · ·		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		1-1	BASELINE [ ] NEW [ X ]				
MDAC ID:	DPS 210 GPC Mode S	Switch			·		
LEAD ANALYST:	T. B. Crib	obs					
ASSESSMENT:							
CRITICALI FLIGHT		EDUNDANCY	SCREENS		CIL ITEM		
HDW/FUN	IC A	В	C				
NASA [ 2 /1R IOA [ 3 /1R	] [ P ] [ P	] [ P ] [ P	] [ ·P ] [ P	]	[ X ] *		
COMPARE [ N /	] [	) [	] [	] .	[ и ]		
RECOMMENDATIONS:	(If dif:	ferent fro	om NASA)	•			
[ · / .	] [	. [	] [	] (AD	[ ] D/DELETE)		
* CIL RETENTION F	RATIONALE:	(If appli		EQUATE	r 1		
DEWADEC.				EQUATE	[ x ]		
REMARKS: THE IOA DOES NOT CRITICALITY OF THE IOA DOES CONCUR N	HIS ITEM WASA'S	AS NOT INC REEVALUA	CREASED BY	THE FAI	LURE MODE.		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/06/86 DPS-211 05-5-B15-	1-3	NASA DATA BASELINE NEW	: [					
SUBSYSTEM: MDAC ID: ITEM:	DPS 211 GPC Outpu	t Switch							
LEAD ANALYST:	T. B. Cri	bbs							
ASSESSMENT:	ASSESSMENT:								
CRITICALI FLIGHT	<del>-</del> -	EDUNDANCY SC	REENS	CIL ITEM					
HDW/FU	-	** <b>B</b>	C						
NASA [ 3 /lR iOA [ 3 /lR	] [ P	] [.P.]	[ P ] [ P ]	[ ] *					
COMPARE [ /	] [	] [ ]		[ ]					
RECOMMENDATIONS:	(If dif	ferent from	NASA)						
\ 1	] [	] [ ]	[ ] (A)	[ ] DD/DELETE)					
* CIL RETENTION F	RATIONALE:	(If applica	ble) ADEQUATE INADEQUATE						
REMARKS: THIS FAILURE MODI B15-1-3 WHICH HAS									

	DPS-213 NONE	NASA DATA BASELINE NEW	
MDAC ID:	DPS 213 GPC Power Switch	·	
LEAD ANALYST:	T. B. Cribbs		
ASSESSMENT:			
CRITICAL: FLIGHT	T		CIL
HDW/FU	NC A B	С	
NASA [ / IOA [ 3 /1R	] [ ] [ ] ] [ P ] [ P ]	[ ] [ P ]	[ ] *
COMPARE [ N /N	] [N] [N]	[и]	[ ]
RECOMMENDATIONS:	(If different from N	'ASA)	
[ /	1 [ ] [ ]	[ ] (A)	[ ] ADD/DELETE)
	RATIONALE: (If applicab	le) ADEQUATE INADEQUATE	
REMARKS: NASA/RI DID NOT ( A FMEA BEING WRITH	COVER THIS FAILURE MODE TTEN SINCE THE CRITICAL	. IOA DOES N ITY OF THIS I	OT RECOMMENT TEM WAS NOT

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/16/86 DPS-214 05-6S-BI	5 OMCl-2	NASA DATA BASELINE NEW			
SUBSYSTEM: MDAC ID:	DPS 214	ODULE CON	•			
LEAD ANALYST:	B. ROBB					
ASSESSMENT:				•		
CRITICALI FLIGHT		REDUNDANC	Y SCREEN	\$	CIL	
HDW/FUN		A	В	С	11511	
NASA [ 3 /3 IOA [ 3 /3	] [	P ] [ NA] [	P ] [ NA] [	P ] NA]	[ ]	*
COMPARE [ /	] [	<b>n</b> ] [	N ] [	N ]	[ ]	
RECOMMENDATIONS:	(If di	fferent	From NASA	)		
\ ]	1 t	1 [	<u></u>	] (AI	[ ] DD/DEL	ETE)
* CIL RETENTION F	RATIONALE	: (If app		ADEQUATE NADEQUATE	[ ]	
REMARKS: IOA DID NOT COVER EFFECTS TO POWER NASA AGREED WITH ACCORDING TO NSTS FOR FMEAS WITH A	UP A GPO THE IOA 3 22206,	ROCKWI ASSESSMEN REDUNDANO	ELL SHOUL IT RECOMM CY SCREEN	D DOWNGRAD: ENDATION.		FMEA.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/16/86 DPS-215 05-6S-BI		NASA DATA BASELINE NEW	[ X ]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 215 DRIVER N	MODULE COM	NTROLLER		
LEAD ANALYST:	B. ROBB				
ASSESSMENT:					
CRITICALI FLIGHT	· ·	REDUNDANG	CY SCREEN	S	CIL ITEM
HDW/FU		A	В	С	44411
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] [ P ] [	P ] [ P ] [	P ] P ]	[ ] *
COMPARE [ /	ı [	] [	J [	] .	[ ] <sub></sub>
RECOMMENDATIONS:	(If d	ifferent	from NASA	)	
[ /	] [	] [	. ] [	] (A	[ ] DD/DELETE)
* CIL RETENTION 1	RATIONALI	E: (If app	plicable)	ADEQUATE	[ ]
REMARKS:			I	NADEQUATE	Ĺ
NO DIFFERENCES.	RITICALIT	TY OF THE		EM IN ORIG WAS NOT I	INAL NCREASED BY

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/17/86 DPS-216 05-6S-BSW1-2						
	DPS 216 SWITCH, GPC POWER	1					
LEAD ANALYST:	B. ROBB						
ASSESSMENT:							
	TY REDUNDANC	Y SCREENS	CIL ITEM				
FLIGHT HDW/FUN		ВС					
NASA [ 3 /3 IOA [ 3 /3	] [ P ] [ ] [ NA] [	P ] [ P ] NA] [ NA]	[ ]*				
COMPARE [ /	] [ N ] [	ו א ן וו	[ ]				
RECOMMENDATIONS:	(If different f	from NASA)					
[ /	] [ ] [	1 [ 1.	[ ] (ADD/DELETE)				
	RATIONALE: (If app	licable) ADEQUAT INADEQUAT	E[]				
THE FAILURE MODE EFFECTS. THE CRI DOWNGRADED TO A	R THIS FAILURE MODER OF PREMATURE OPER TICALITY OF THE R	ATION CAUSES NO S OCKWELL FMEA SHO	HARMFUL ULD BE				
ACCORDING TO NSTS	THE IOA ASSESSMEN 3 22206, REDUNDANC CRITICALITY OF 3,	CY SCREENS MUST F	BE "NA" OR BLANK				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-217	Wl-3 (NEW		NASA DATA: BASELINE [ ] NEW [ X ]			
SUBSYSTEM: MDAC ID: ITEM:	DPS 217 SWITCH, G	SPC POWER					
LEAD ANALYST:	B. ROBB						
ASSESSMENT:							
CRITICAL: FLIGHT HDW/FUI	r	REDUNDANC	Y SCREENS B	s C	CIL ITEM		
NASA [ 2 /lR IOA [ 2 /lR	] [ ]	?][:	P ] [ P ] [	P ] P ]	[ X ] *		
COMPARE [ /	] [	) [	] [	3	[ ]		
RECOMMENDATIONS:	(If di	fferent f	rom NASA	)			
. [ /	] [,	] [	) . [	] (A)	[ ] DD/DELETE)		
* CIL RETENTION	RATIONALE:	(If app	•	ADEQUATE NADEQUATE	[ x ]		
REMARKS: NO DIFFERENCES. NEW FMEA. IOA DI ANALYSIS.				T THE DPS ODE IN THE			
THE CIL RETENTION AVAILABLE.			~				
IOA AGREES THAT (FOR THIS FAILURE		TY SHOUL	D BE SAME	E AS LOSS O	F GPC OUTPUI		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			PATA: INE [ X ] NEW [ ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 218 STATUS LIGHT		
LEAD ANALYST:	B. ROBB		
ASSESSMENT:			
CRITICAL: FLIGHT		DANCY SCREENS	CIL ITEM
HDW/FUI		В	TTEM
NASA [ 3 /3 IOA [ 3 /3	] [ P ] ] [ NA]	[ P ] [ P ] [ NA]	[ ] *
COMPARE [ /	] [N]	[N] [N]	[ ] .
RECOMMENDATIONS:	(If differe	nt from NASA)	
[ /	1 [ ]	ַר בּיי ז <u>יי</u> בּיי ז <u>יי</u> בּיי ז	(ADD/DELETE)
* CIL RETENTION F	RATIONALE: (If	applicable) ADEQUA INADEQUA	
ANALYSIS.		VER THIS ITEM IN T	
ACCORDING TO NSTS FOR FMEAS WITH A		DANCY SCREENS MUST F 3/3.	BE "NA" OR BLANK

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/20/80 DPS-219 05-5-B2			NASA DATA BASELINE NEW	[ X	]
SUBSYSTEM: MDAC ID: ITEM:	DPS 219 CICU					
LEAD ANALYST:	B. ROBB					
ASSESSMENT:						
CRITICAL FLIGH		REDUNDAN	ICY SCRE	ENS	CIL ITEN	
HDW/FU		A	В	С	1111	4
NASA [ 3 /3 IOA [ 3 /3	] [	P ] .[ NA] [	P] NA]	[ P ] [ NA]	[	] <b>*</b> ]
COMPARE [ /	- 3	[ N ]	[ и ]	[ N ] .	[	1.
RECOMMENDATIONS:	(If d	ifferent	from NA	.SA)		
[ /	] [	) [	. 1	[ ] (A	[ \DD/DI	] ELETE)
* CIL RETENTION	RATIONAL	E: (If ar	plicabl	e) ADEQUATE INADEQUATE	[	]
REMARKS: NO DIFFERENCES. ANALYSIS.	IOA DID	NOT COVE	R THIS	-	INAL	J
ACCORDING TO NST.				ENS MUST BE	"NA"	OR BLANK

	10/20/86 DPS-220 05-5-B16-1-1	NASA DATA BASELINE NEW	: [ X ] [ ]
	DPS 220 SWITCH, IPL		-
LEAD ANALYST:	B. ROBB		
ASSESSMENT:			
CRITICALI FLIGHT HDW/FUN			CIL ITEM
NASA [ 3 /2R IOA [ 3 /2R	] [P] [P]	]	[ ] ***********************************
COMPARE [ /	] [ - ] [	1 [ ]	[ ]
RECOMMENDATIONS:	(If different fr	om NASA)	
[ /	] [ ] [	) [ ] (A)	[ ] DD/DELETE)
	NATIONALE: (If appl	icable) ADEQUATE INADEQUATE	
REMARKS: NO DIFFERENCES. ANALYSIS.	IOA DID NOT COVER	THIS ITEM IN THE O	DRIGINAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-221	NASA DATA BASELINE NEW	[ X	]
SUBSYSTEM: MDAC ID: ITEM:	DPS 221 INDICATOR, IPL			
LEAD ANALYST:	B. ROBB			
ASSESSMENT:				
CRITICAL FLIGH HDW/FU		c	CIL	ſ
HDW/FU.	NC A B	·		
NASA [ 3 /3 IOA [ 3 /3	] [ P ] [ P ] [ ] [ NA] [ NA] [	P ] NA]	[.	] <b>*</b>
COMPARE [ /	] [и] [и] [	N ]	[	] .
RECOMMENDATIONS:	(If different from NASA)			
[ /	1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1 (1	] (A	[ DD/D1	] ELETE)
* CIL RETENTION	RATIONALE: (If applicable)			
	,	ADEQUATE ADEQUATE		]
REMARKS: NO DIFFERENCES.	IOA DID NOT COVER THIS ITE	M IN THE	ORIG:	INAL
	S 22206, REDUNDANCY SCREENS	MUST BE	"NA"	OR BLANK

ASSES ASSES NASA	SME	NΤ	ID:	E:	DP	/20/ 5-22 -5-E	22		-2					ASA DA BASELI		[	x	]		
SUBSYMDAC		M:			DPS 22: IN	2	\TC	DR,	IPL											
LEAD	ANA:	LYS	T:		в.	ROE	ВВ													
ASSES	SMEI	T:																		
	(		TIC					REI	LADNUC	VC.	Y SC	REEN	S			CI	L			
			DW/					A		,	В		С			*+	EH			
	SA OA	[	3 / 3 /	3 3	]		[	P NA]		[ ]	P ] NA]	]	P N	] A]		[	:	] :	*	
COMPA	ARE	[	•	/	]		[	N	]	[	иј	[	N	3		. [		]		
RECOM	MEN	DAT	CION	ıs:		(If	đi	ffe	erent	f	rom	NASA	١)				•			
		[	/		]		[	]			<b>י</b>	[		]	(AI	[ DD/	DE	] LE:	ΓE)	
		PEN	TIO	N F	TAT:	IONA	LE	: (	(If ap	g.	lical	·	A.	DEQUAT DEQUAT	Œ	[	•	]	:	
REMAR NO DI ANALY	FFEI		CES	•	IOA	DI	D :	TOM	COVI	ER	THIS	SIT	EM	IN TH	iE C	RI	GII	IAN	Ġ	
	DIN	3 T	O N VITH	STS I A	CR	220 <i>6</i> ITI(	CAI	REI LIT	OUNDA Y OF	NC 3/	Y SC	REEN	S	MUST 1	BE '	''NA	711 (	OR.	BLAN	İK

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/20/86 DPS-223 05-5-B19-1-1	NASA DA' BASELII N	_
SUBSYSTEM: MDAC ID: ITEM:	DPS 223 INDICATOR OUTPU	I, BARBER POLE	•
LEAD ANALYST:	B. ROBB		
ASSESSMENT:			
CRITICALI FLIGHT HDW/FUN	r	NCY SCREENS B C	CIL ITEM
NASA [ 3 /3 IOA [ 3 /3	] [ P ] ] [ NA]	[ P ] [ P ] [ NA] [ NA]	[ ] * .
COMPARE [ - /	] [N]	[и] [и]	[ ]
RECOMMENDATIONS:	(If different	from NASA)	
[ /	] [ ]	[ ] [ ]	[ ] (ADD/DELETE)
* CIL RETENTION F	RATIONALE: (If a	oplicable) ADEQUAT INADEQUAT	
REMARKS: NO DIFFERENCES. ANALYSIS.	IOA DID NOT COV	ER THIS ITEM IN TH	E ORIGINAL
	S 22206, REDUNDA CRITICALITY OF	NCY SCREENS MUST E 3/3.	E "NA" OR BLANK

ASSESSME ASSESSME NASA FME	NT I	D:	DPS-	•		BASELINE [ X ] NEW [ ]			
SUBSYSTE MDAC ID: ITEM:			DPS 224 INDI	CATOR OUT	PUT, BARE	ER POLE	·		
LEAD ANA	LYST	<b>':</b>	B. F	ROBB					
ASSESSME	NT:								
				REDUN	DANCY SCR	EENS	CIL ITEM		
		LIGH W/FU	NC	A	В	С	#1EM		
NASA IOA	[ 3 [ 3	/3	]	[ P ] [ NA]	[ P ] [ NA]	[ P ] [ NA]	* [ ]		
COMPARE	[	./	]	[ N ]	[ N ]	[ N ]	[ ] ···	. 1	
RECOMMEN	IDATI	ons:	: (1	f differe	nt from N	(ASA)	. 2	ų.	
	1	/	1	[ ]	[ ]		[ ] (ADD/DELETE)		
* CIL RE	TENT	ION	RATIO	NALE: (If	applicab	le) ADEQUA INADEQUA	ATE [ ]		
ANALYSIS ACCORDIN	G TO	NST	S 222		DANCY SCR		THE ORIGINAL BE "NA" OR BLA	'nĸ	

ASSESSME NASA FME	NT I	D:	DPS	727/86 3-225 -5-B02-						LINE NEW	[		]	
SUBSYSTE MDAC ID: ITEM:	M:		DPS 225 INI		IPUT	PROĆE	SSOI	R (IOP	)					
LEAD ANA	LYST	:	B.	ROBB										
ASSESSME	NT:													
		ICAL: LIGH		1	REDUN	IDANCY	SCF	REENS			CI II	L EM	í	
		W/FU		į	A.	В		С						
NASA IOA	[ 2	/1R /1R	].	[ ]	P ] P ]	[ P [ P	]	[ P [ P	]		[	X X	]	*
COMPARE	[	/	)	[·	, ]	[	]	[	]	٠	[		]	
RECOMMEN	IDATI	ONS:		(If di	ffer	ent fr	om 1	NASA)						
	[	/	J	[	]	. [	]	·	]	(A	[ DD/	'DE	] :LE	TE)
* CIL RE	TENT	ION :	RAT	ONALE	: (If	appl	icab	A		ATE ATE		×,	]	
REMARKS: NO DIFFE ANALYSIS		ES.	IOA	DID N	OT C	OVER :	THIS	FAIL	JRE :	MODE	Iì	1 C	RI	GINAI

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/30/86 DPS-226 05-6S-BF			NASA DATA BASELINE NEW	[ ]	] }
	DPS 226 RESISTOR	₹ .	. "	en en en en en en en en en en en en en e		
LEAD ANALYST:	H J LOWE	ERY				
ASSESSMENT:						
CRITICAL FLIGH		REDUNDA	NCY SCRE	ENS	CIL ITEM	
HDW/FU	NC	A	В	С		
NASA [ /NA IOA [ /NA	] [	NA] NA]	[ NA] [ NA]	[ NA] [ NA]		*
COMPARE [ /	ָ	]	[[ ]	[ ]	[ ]	]
RECOMMENDATIONS:	(If d	ifferent	t from NA	.SA)		
[ /	ן [	j .	[ ]	(A)	[ DD/DEI	
* CIL RETENTION	RATIONALE	E: (If a	pplicabl	e) ADEQUATE INADEQUATE		] ]
REMARKS: FMEA HAS BEEN DE FUSE.				•		
IOA DID NOT COVE	R THIS FA	AILURE 1	MODE IN I	HE ORIGINAL	ANALY	SIS.

ASSESSMENT DA ASSESSMENT ID NASA FMEA #:	: DPS-2			]	NASA DA' BASELII N		<b>x</b> ] .
SUBSYSTEM: MDAC ID: ITEM:	DPS 227 FUSE						
LEAD ANALYST:	нјк	OWERY					
ASSESSMENT:							
	CALITY IGHT	REDUND	ANCY S	CREENS		CII	
	/FUNC	A	В	C	3		•
NASA [ 3 ]	/1R ] /1R ]	[ P ] [ P ]	[ P ] [ P ]	[ I	P ]	[	] * ]
COMPARE [	/ ]	[ ]	[ ]	[	]	Ţ	]
RECOMMENDATIO	NS: (If	differer	nt from	NASA)			
[ .	/ <u>]</u>	[ . ]	[ ]	. [	<b>1</b>	[ I\dda)	) DELETE)
* CIL RETENTI REMARKS:	ON RATION	ALE: (If	applic	. 1	ADEQUAT: ADEQUAT:		]
NO DIFFERENCE	s. IOA DI	D NOT CO	VER TH	IS FAII	LURE MO	DE IN	THE

ORIGINAL ANALYSIS.

ASSESSME ASSESSME NASA FME	NT I	D:	DPS-2	.0/30/86 NASA DATA: PS-228 BASELINE [ X ] 5-6S-BRPC1-1 NEW [ ]								
SUBSYSTE MDAC ID: ITEM:	M:		DPS 228 CONTRO	OLLE	ER, R	EMOTE	POWER					
LEAD ANA	LYST	:	нјк	OWE	RΥ							
ASSESSME	NT:										1. ×	
	F	LIGH					SCREEN			CIL ITEN	_ ¶	
	HD	w/FUI	NC	A	7	В		С				
NASA IOA	[ 3 [ 3	/1R /1R	]	[	) )	[ P [ P	] [	P ] P ]		[	] *	
COMPARE	[	/	]	[	)	[	] [	]		[	]	
RECOMMEN	DATI	ons:	(If	di	ffere	ent fro	om NASA	)				
	ſ	/ .	1	[	)	[	] [	]	, (AI	[ DD/DI	] ELETE)	
* CIL RE	TENT	ION 1	RATION	ALE:	(If	appli		ADEQ	UATE UATE			
REMARKS: NO DIFFE ORIGINAL				D N	OT C	OVER 1	HIS FA	LURE	MODE	IN T	THE	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/30/8 DPS-229 05-6S-BI			NASA DATA BASELINE NEW	X ] 2	]
SUBSYSTEM: MDAC ID: ITEM:	DPS 229 CONTROL	LER, REM	OTE POWE	R		
LEAD ANALYST:	H J LOW	ERY				
ASSESSMENT:						
CRITICAL		REDUNDA	NCY SCRE	ENS	CIL ITEM	
FLIGH HDW/FU		A	В	С	TIEM	
NASA [ 3 /3 IOA [ 3 /3	] [	P ] NA]	[ P ] [ NA]	[ P ] [ NA]	[	] * ]
COMPARE [ /	] [	[и]	[и]	[и]	[	]
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)		
[ /	) [	]	. 1	[ ] (A)	DD/DE	] LETE)
* CIL RETENTION	RATIONALI	E: (If a	pplicabl		r	٠.
	`			ADEQUATE INADEQUATE		]
REMARKS: NO DIFFERENCES. ORIGINAL ANALYSI ACCORDING TO NST	s. s 22206,	REDUNDI	NACY SCRE			
FOR FMEAS WITH A	. CRITICA	LITY OF	3/3.			

ASSESSME ASSESSME NASA FME	NT	ID:		DP	./03 S-2: 5-6S	30		0X-1	L (N	EW	)				DAT LINI NEV	Ξ [	x	]	-	
SUBSYSTE MDAC ID: ITEM:	M:			DP 23 DI				nt grit												
LEAD ANA	LYS'	T:		H	J L	CWC	ER	Z												
ASSESSME	NT:																			
	CRI	TIC FLI					RI	EDUN	DAN	CY	SCF	REENS	5		2.4		IL CEN	1		
	H	DW/	FU	1C			A			В			С							
NASA IOA	[	3 / 3 /	1R 1R	]		[	P P	]	]	F	]	[	P P	]		[	X X	]	<b>★</b> . □	
COMPARE	[	/	,	]		. [		J	[		]	ָ ֭֭֓֞֞֞֞֞֞֞֞֞֞	ı	]		[		j	-	
RECOMMEN	DAT	ION	is:		(If	đ:	ifi	fere	nt:	fr	om 1	NASA)						s= 1		
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* CIL RE		TIO	N F	TAS	ION	ALI	2:	(If	app	) [	lcab	ole)	AD:		ATE ATE	[	X	]		441
REMARKS: NO DIFFE		CES	•	IO	A DI	D	NO	T C	OVE	<b>?</b> ]	HIS	FAI	LUI	RE :	MODE	E II	ני וא	THE	}	
ORIGINAL THE CIL AVAILABL NASA AGR	RET	ENT	IOI	I R												, I	- M	IOI	YE	T
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	11/03/86 DPS-231 05-5-B15-1-1	-		[ x ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 231 SWITCH, NORM	IAL-TERM BACK-U	J <b>P</b>	
LEAD ANALYST:	H J LOWERY			
ASSESSMENT:				
CRITICAL: FLIGH		INDANCY SCREENS		CIL ITEM
HDW/FU	NC A	В	C	
NASA [ 3 /lR IOA [ 3 /lR	] [ P ]	[ P ] [ [ P ] [	P ] P ]	[ ] *
COMPARE [ /	] [ ]	[ ] [	]	[ . ]
RECOMMENDATIONS:	(If differ	rent from NASA)		• -
[ /	1 . [ 1	[ ] [	] (AD	[ ] D/DELETE
* CIL RETENTION	RATIONALE: (I		ADEQUATE	
REMARKS: NO DIFFERENCES. ORIGINAL ANALYSI		COVER THIS FAI	LURE MODE	IN THE

ASSESSMENT ASSESSMENT NASA FMEA	ID:	DPS-23								SA DATA: ASELINE NEW	[ X	]		
SUBSYSTEM: MDAC ID: ITEM:		DPS 232 SWITCH	, G	PC POI	WEF	2								
LEAD ANALY	ST:	B. ROB	В											
ASSESSMENT	?:													
CR	RITICAL FLIGH	ITY T	R	EDUND	ANC	CY	SCREE	ens	}		CIL			
		NC	A			В			С			_		
NASA [ IOA [	3 /1R 3 /1R	]	[ P	]	[	P P	]	[	P P	]		]	*	-
COMPARE	[ /	)	[	J	[		)	[		1.	[	]		
RECOMMENDA	ATIONS:	(If	dif	feren	t :	Ero	om NAS	SA)		-				
	. /	1	[	] .	[		]	[		] . (AI	[  D/D		TE)	4
* CIL RETE	ENTION	RATIONA	LE:	(If a	app	11	cable			EQUATE EQUATE		]		
REMARKS: THIS FAILU SAME EFFE THREE REDU NO DIFFERE	CT AS T INDANT	HE LOSS POWER S	OF OUR	A DRI	VE S	R LO:	MODUI ST.	ĿE	co		R. (	ONE	OF	E -
ORIGINAL A	ANALYSI	s.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/07/86 DPS-300 05-5-B22-1	1-1	_	ASA DATA BASELINE NEW	[ X ]
	DPS 300 KEYBOARD S	SWITCH			
LEAD ANALYST:	H J LOWERY	Y			
ASSESSMENT:					
CRITICAL: FLIGHT	ITY RI	EDUNDANCY	SCREENS		CIL ITEM
HDW/FU	NC A	В	С		
NASA [ 2 /lR IOA [ 3 /lR	] [ P ] [ P	] [ P ] [ P	] [ P ] [ P	]	[ X ] *
COMPARE [ N /	) [	] [	] [	J	[ ]
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)		
[ /	] [	] [	] [	] (A)	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appli	A	DEQUATE DEQUATE	
REMARKS: REDUNDANT HARDWAY DEORBIT. KEYBOAY SECOND RELATED F	RD COMMAND AILURE WOU	CAPABILI' LD RESULT	IN LOSS	BE INHIB OF LIFE/	ITED. THE VEHICLE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-300A 05-5-B24-1-2		NASA DATA: BASELINE NEW	[ X ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 300 KEYBOARD SWITCH	I	S. Alexander	
LEAD ANALYST:	H J LOWERY			
ASSESSMENT:				i <del>na ila da</del> anticoloria.
CRITICAL		NCY SCREENS		CIL
FLIGHT HDW/FUN	_	В	С	ITEM
NASA [ 3 /2R IOA [ 3 /1R	] [ P ] ] [ P ]	[ P ] [ [ P ] [	P ] P ]	[ ] *
COMPARE [ /N	] [ ]	[ ] [	]	[ ]
RECOMMENDATIONS:	(If different	from NASA)		
. 1	] [ ]	1 [	] (AD	[ ] DD/DELETE)
* CIL RETENTION F	RATIONALE: (If a		ADEQUATE IADEQUATE	
REMARKS: NO DIFFERENCES. CRITICALITY. IOA DOES CONCUR			UPGRADE TH	E FUNCTIONAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/8 DPS-300 05-5-B2	В			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	DPS 300 KEYBOAR	D SWITC	H			
LEAD ANALYST:	H J LOW	ERY				
ASSESSMENT:						<b></b> .
CRITICAL: FLIGHT	r	REDUND		SCREEN		CIL ITEM
HDW/FUI	NC	A	В		С	
NASA [ 2 /lR IOA [ 3 /lR	] [	P ] P ]	[ P	] [	P ] P ]	[ X ] *
COMPARE [ N /	] . [	3	Į,	] [	. ]	[ N ]
RECOMMENDATIONS:	(If d	ifferen	t fro	om NASA	<b>L)</b>	
[ /	1 . [	1 .	[	] [		[ ] .DD/DELETE)
* CIL RETENTION I	RATIONAL	E: (If a	appli	cable)		
				·	ADEQUATE NADEQUATE	[
REMARKS: IOA DOES CONCUR THE CIL RETENTION AVAILABLE. THIS CRITICALITY.	N RATION	ALE IS	INADE	QUATE	BECAUSE IT ADE THE FU	

ASSESSME ASSESSME NASA FME	NT I	D:	DPS.	-301	5 . <b>-</b> 1-1					DATA LINE NEW	[		
SUBSYSTEM MDAC ID:	M:		DPS 301 X/Y	DEFI	ECTIO	ON AMPI	LIFI	ERS					
LEAD ANA	LYST	:	н Ј	LOWE	RY								
ASSESSME	NT:												
•	F	LIGH:	Г			NDANCY	SCR				CIL		
	HD	W/FUI	NC		A	В		С					
NASA IOA	[ 3 [ 3	/1R /1R	]	[	P ] P ]	[ P [ P	]	[ P [ P	]		[	]	*
COMPARE		/	)	.[	]	[	]	[	]		[	]	
RECOMMEN	DATI	ONS:	(	If di	iffer	ent fro	om N	IASA)					-
	ι.	/	3	ſ	3	[	]	<b>[</b> [ .	J	(Al	[ DD/D	] ELE	ETE)
* CIL RE	TENT	ION I	RATIO	ONALE	: (If	appli	cab	A	DEQU	JATE JATE	[	]	
REMARKS: CRTS (DUS NASA AGRI IOA DOES	EED	WITH	THE	IOA	ASSES	SMENT	REC	EHICLE OMMEN					

	DPS-302	· · ·							]
	DPS 302 VIDEO AM								
LEAD ANALYST:	H J LOWE	J LOWERY							
ASSESSMENT:	ASSESSMENT:								
CRITICAL FLIGH HDW/FU	T	REDUND	ANCY	SCREE	ns c			CIL	
•			_	1		1		Г	7 *
IOA [ 3 /1R	] [	P ]	_ [ P	]	[ P	]	•	ĺ	j
COMPARE [ /	J [	J	[	3	[	].		[	3
RECOMMENDATIONS:	(If di	ifferen	nt fro	om NAS	A)				
[ /	] [	]	Γ	]	[	]	(A)	[ DD/DI	] ELETE)
* CIL RETENTION	RATIONALE	: (If	appli	cable	ı)				-
ADEQUATE [ ] INADEQUATE [ ]									
REMARKS: CRTS (DUS) ARE ENASA AGREED WITH IOA DOES CONCUR	THE IOA	<b>ASSESS</b>	MENT	RECOM			ion.		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/08/86 DPS-303 05-5-B21-		NASA DATA BASELINE NEW	: [ x	]			
	DPS 303 CATHODE-R							
LEAD ANALYST:	H J LOWER	d J LOWERY						
ASSESSMENT:								
CRITICAL FLIGH HDW/FU				c	CIL	M		
NASA [ 3 /1R IOA [ 3 /1R		) [ P	] . [	P ] P ]	[	) * )		
COMPARE [ /	] [	) [	] [	3	[	]		
RECOMMENDATIONS:	•							
[ /	1 [	] [	] [	] (A	[ DD/DI	] ELETE)		
* CIL RETENTION		(If appl		ADEQUATE ADEQUATE	[			
REMARKS: CRTS (DUS) ARE E NASA AGREED WITH IOA DOES CONCUR	SSENTIAL F THE IOA A	SSESSMENT	RECOMME	E. NDATION.		n o dia kual oo oo o		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-304		NASA DATA BASELINE NEW	
MDAC ID:	DPS 304 HI AND LOW VOI	LTAGE POWE	R SUPPLIES	
LEAD ANALYST:	H J LOWERY			
ASSESSMENT:				
CRITICAL: FLIGH	ITY REDUNE	DANCY SCRE	ENS	CIL ITEM
HDW/FU		В	C	
NASA [ 3 /lR IOA [ 3 /lR	] [ P ] ] [ P ]	[ P ] [ P ]	[ P ] [ P ]	[ ] *
COMPARE [ /	] [ ]	[ ]	[ ] ,	[ ]
RECOMMENDATIONS:	(If differen	nt from NA	(ASA)	
[ /.	] [ ]	[ ]	[ ]	[ ADD/DELETE;
* CIL RETENTION	RATIONALE: (If	applicabl	.e) ADEQUATE INADEQUATE	
REMARKS: CRTS (DUS) ARE ES NASA AGREED WITH			HICLE.	-

ASSESSMENT DATE ASSESSMENT ID:	: 10/08/86 DPS-305		1	NASA DATA BASELINE	: [	]
NASA FMEA #:		24-1		NEW	χĵ	j
SUBSYSTEM: MDAC ID: ITEM:	DPS 305 RPC			· ·		v - <u></u>
LEAD ANALYST:	H J LOWERY	7				
ASSESSMENT:						
CRITICA FLIG	LITY RE	DUNDANCY	SCREENS		CIL ITEM	
HDW/F		В	C	2	TIDM	
NASA [ 3 /1 IOA [ 3 /1	R ] [ P R ] [ P	] [ P ] [ P	] [ ]	9 ]	[	] * ]
COMPARE [ /	] [	] " [	] (	3	[	<b>)</b>
RECOMMENDATIONS	: (If diff	ferent fr	om NASA)			
\ 1	] [	] [	] [	] (A)	[ DD/DE	] LETE)
* CIL RETENTION	RATIONALE:	(If appl:	7	ADEQUATE ADEQUATE		j
REMARKS: CRTS (DUS) ARE FLIGHT OF REDUN MAY BE ERRONEOU	DANT STRINGS	WHICH IS	VEHICLE PROVIDE	VERIF	MEAS	UREMENTS

NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.

INITIATED BY A REDUNDANT CIRCUIT.

	ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-306					NE [ X EW [	]	
		DPS 306 MEMORY							
	LEAD ANALYST:	H J LOWE	ERY						
	ASSESSMENT:								
	CRITICAL: FLIGH		REDUNDA	NCY	SCREEN	S	CIL ITE		
	HDW/FU		A	В		С			
,	NASA [ 3 /lR IOA [ 3 /lR	] [	P ] P ]	[ P [ P	] [	Pj. Pj	[	] *	
	COMPARE [ /	J [	]	[	] [	]	[	]	
	RECOMMENDATIONS:	(If di	ifferent	fro	om NASA	.)	·		
	[ /	] [	<b>]</b>	[	] [	]	[ (ADD/D	] ELETE)	
	* CIL RETENTION	RATIONALE	E: (If ag	ppli		ADEQUAT NADEQUAT		]	
	REMARKS: NO DIFFERENCES. CRITICALITY.	THIS FAI	LURE MO	DE I	OID NOT	UPGRADE	THE F	UNCTIO	NAL

ASSESSME ASSESSME NASA FME	NT IL		10/08 DPS-3 05-5-	07	-1-2				_	BASEI		: [ [	х	]		
SUBSYSTER MDAC ID: ITEM:	M:		DPS 307 KEYBO	ARD	ADAI	PTER										
LEAD ANA	LYST:		нјц	OWE	RY				-							1.75
ASSESSME	NT:															
·	CRITI	CALI IGHT		I	REDUN	IDANC	s	CREEN	1S			CI	L			
		/FUN		2	Ą	F	3		С	:						
NASA · IOA	[ 3	/1R /1R	]	[ I	? ] ? ]	[ ] [ ]	) )	. [	[ P	)		[		]	*	
COMPARE	[	/	J	[	J	[	j		[	]		[	,	]		\$ 1 Z
RECOMMEN	DATIC	ons:	(If	di	ffere	ent fi	com	NASZ	A)	2						
	[.	/	1	[	]	[	)	(	•	1	(AI	[ /QC/	DE:	] LE	TE)	
* CIL RET	renti	ON F	RATION	ALE:	(If	appl	ica		A	DEQUA		[		]	5.7 <sub>1.1</sub>	j (5 m. 1919)
REMARKS: NO DIFFEI CRITICALI		s.	THIS	FAII	URE	MODE	DII	ron c	ט יו	PGRAI	E TH	ΊE	FUI	NC	TIO	NAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:							
SUBSYSTEM: MDAC ID: ITEM:	DPS 307 KEYBOARD	ADAPTER					
LEAD ANALYST:	H J LOWER	Y					
ASSESSMENT:							
CRITICAL: FLIGH HDW/FU	r	EDUNDANCY B		c .	CIL ITEM		
NASA [ 2 /1R IOA [ 3 /1R	] [ P	] [ P ] [ P	] [	P ] P ]	[ X ] *		
COMPARE [ N /	] [	] [	] [	]	[ N ]		
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)				
[ /	] [	1 [	] [	] (AI	[ ] DD/DELETE)		
* CIL RETENTION D	RATIONALE:	(If appli	• ;	ADEQUATE ADEQUATE	[ x ]		
REMARKS: MULTIPLE FAILURE DISSIMILAR FAILU PREMATURE TRANSI KEYBOARD ENTRY IS PREVIOUS FAILURE OPS MODE RECALL, IOA DOES CONCUR	RES WERE E TION FROM ( S TO BE CLI IS REQUIR AS STATED	XCLUDED FF ONE MODE T EARED IS A ED TO NECE IN NASA F	ROM THE TO ANOTH: TWO FA: ESSITATE FMEA 05-	IOA. ER MODE WI ILURE EFFI CREW INIT 5-B23-1-3	HEN OPS ECT SINCE A FIATION OF		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/08/86 DPS-308 05-5-B23			NASA DATA: BASELINE NEW	[ X ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 308 SYMBOL (	GENERATOR	ge america de la compansión de la compan	e de semi	A
LEAD ANALYST:	H J LOWI	ERY			
ASSESSMENT:					
CRITICAL FLIGHT		REDUNDANC	Y SCREENS		CIL
HDW/FUI		A	В	С	11211
NASA [ 3 /1R IOA_ [ 3 /1R	] [	P ] [ P ] [	P ] [ P ] [	P ] P ]	[ ] *
COMPARE [ /	] [	J [	) [	]	
RECOMMENDATIONS:	(If d	ifferent f	rom NASA)		÷
[ /	j [	] [	] [	) (AD	[ ] D/DELETE)
* CIL RETENTION E	RATIONALE	E: (If app		ADEQUATE ADEQUATE	
REMARKS: NO DIFFERENCES. CRITICALITY.		LURE MODE		UPGRADE TH	E FUNCTIONAL
	The State of the Construction		1 - 1 - <del>-</del>		
a. John			en en en en en en en en en en en en en e	e e e	

ASSESSMEN ASSESSMEN NASA FMEA	T I	D:	DPS	PS-308A 5-5-B23-1-1										DATA: LINE NEW	[ X	]	
SUBSYSTEM MDAC ID: ITEM:			DPS 308 SYN	3	. G	EN	ERAT	OR									
LEAD ANAI	YSI	!:	нЗ	J LO	WE	RY	•										
ASSESSMEN	T:																
C	F	CICAL: LIGHTOW/FUI	r			RE A	DUND.	ANG	CY B	SC	REENS	c			CIL		
NASA IOA	[ 3	). /lR 	]		[	P P	].	[	P P	]	[	P P	]		[	]	*
COMPARE	[	/	]	,	[		]	[		]	[		]		[	]	
RECOMMEN	DAT:	ions:		(If	d:	if:	feren	t	fr	om	NASA)	, -					
	[	/	]		[		]	[		]	[		]	(Al	[   		
* CIL RET	ENT	TION :	RAT:	IONA	LE	Ξ:	(If	apı	<b>91</b> :	ica	-			ATE ATE	[	]	
REMARKS: THIS FAIL CONSIDERS "LOSS OF NO DIFFES CRITICAL	ED T OUT RENC	TO BE TPUT" CES.	CO.	VERI	ΞD	B?	Y THI	S :	RO	CKW.	ELL F	M	EA W	ITH I	FAIL	JRE	

	10/08/86 DPS-309 05-5-B23				NASA DAT. BASELINI NEV	E [ X ]	]
MDAC ID:	DPS 309 MIA	<u>.</u> .					ura e a r Se e a se
LEAD ANALYST:	H J LOWE	RY					
ASSESSMENT:						*: :	.* .
CRITICALI FLIGHT		REDUND	ANCY	SCREEN	<b>S</b>	CIL ITEM	
HDW/FUN		A	В		С	TIEM	
· NASA [ 3 /1R IOA [ 3 /1R	] [	P ] P ]	[ P	] [	P ] P ]	[ ]	<b>*</b>
COMPARE [ /	] [	]	(	] [	1	[ ]	s.
RECOMMENDATIONS:	(If di	.fferen	t fro	om NASA	.)		
[ /	j t	]	[	] [	] (2	[ ] ADD/DEI	
* CIL RETENTION I REMARKS: NO DIFFERENCES.	RATIONALE	: (If a	appli	I	ADEQUATE NADEQUATE	[ ]	- <u>-</u>   

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/08/86 DPS-310 05-5-B23-3	1-2	N	ASA DATA BASELINE NEW		]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 310 CONTROL LO	OGIC					
LEAD ANALYST: H J LOWERY							
ASSESSMENT:							
CRITICAL FLIGH		EDUNDANCY	SCREENS		CIL ITEM	1	
HDW/FU	NC A	В	C	!			
NASA [ 3 /1R _IOA [ 3 /1R	] [ P	] [ P ] [ P	] [ P	]	[	] <b>*</b>	
COMPARE [ /	] [	] [	] [	]	[	]	
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)				
[ /	] [	) · [	נ	] (A)	[ DD/DE	LETE	
* CIL RETENTION  REMARKS: NO DIFFERENCES.	RATIONALE:	(If appl:	Ą	DEQUATE	[	]	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/08/86 DPS-311 05-5-B23-1-2		NASA DATA BASELINE NEW	[ X ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 311 POWER SUPPLI	ES	S. 775	
LEAD ANALYST:	H J LOWERY			
ASSESSMENT:				
CRITICALI FLIGHT HDW/FUN	r	NDANCY SCREE	ns c	CIL ITEM
•			r p 1	f 1. *
NASA [ 3 /1R IOA [ 3 /1R	[ P ]	[P]	[ P ] [ P ]	[ ].*
COMPARE [ /	] [ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS:	(If differ	ent from NAS	A)	
[ /	1 [ 1	Ċ 1	[ ] (A)	[ ] DD/DELETE)
* CIL RETENTION F REMARKS: NO DIFFERENCES.	RATIONALE: (I	and the second of the second o	) ADEQUATE INADEQUATE	

				VI 61 D1M1		
ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/08/86 DPS-312 05-6S-BR			NASA DATA BASELINE NEW	[ X ]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 312 RPC					
LEAD ANALYST:	H J LOWE	RY				
ASSESSMENT:						
CRITICAL: FLIGH		REDUNDA	NCY SCRE	ENS	CIL ITEM	
HDW/FUI		A	В	C	11511	
NASA [ 3 /lR IOA [ 3 /lR	] [	P ] P ]	[ P ] [ P ]	[ P ] [ P ]	[ ] *	
COMPARE [ /	] [	]	[ ]	[ ]	[ ]	
RECOMMENDATIONS:	(If di	.fferent	from NA	SA)		
[ /	] -[	1	[ ]	[ ] (A	[ ] .DD/DELETE)	
* CIL RETENTION	RATIONALE	: (If a	pplicabl			
				ADEQUATE INADEQUATE		
REMARKS:  VERIFICATION IN FLIGHT OF REDUNDANT STRINGS WHICH IS PROVIDED BY MDM MEASUREMENTS MAY BE ERRONEOUS SINCE THE STATUS MEASUREMENT DERIVATION IS INITIATED BY A REDUNDANT CIRCUIT.  THIS FAILURE MODE DID NOT UPGRADE THE FUNCTIONAL CRITICALITY.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-312A 05-6S-BDI01-1	na B	ASA DATA: ASELINE [ X ] NEW [ ]
MDAC ID:	DPS 312 RPC		
LEAD ANALYST:	H J LOWERY		
ASSESSMENT:			
CRITICALI FLIGHT	TY REDUND	ANCY SCREENS	CIL ITEM
HDW/FUN		В С	LIEM
NASA [ 3 /1R IOA [ 3 /1R	] [ P ] ] [ P ]	[ P ] [ P [ P ] [ P	] [ ] *
COMPARE [ /	] [ ]	[ ] [	] [ ]
RECOMMENDATIONS:	(If differen	t from NASA)	
[ /	] [ ]	[ ] [	] [ ] (ADD/DELETE)
* CIL RETENTION F	RATIONALE: (If a	AD	EQUATE [ ] EQUATE [ ]
THIS FAILURE MODE TO BE COVERED BY IOA DOES CONCUR W NOT UPGRADE THE I VERIFICATION IN I	E "OPEN/CLOSED/ THIS ROCKWELL WITH NASA'S REEV FUNCTIONAL CRIT FLIGHT OF REDUN MAY BE ERRONEO	PREMATURE OPER FMEA WITH FAII VALUATION. THE 'ICALITY. DANT STRINGS WOUS SINCE THE S'	GINAL IOA ANALYSIS. ATION" IS CONSIDERED LURE MODE "OPENS". IS FAILURE MODE DID HICH IS PROVIDED BY FATUS MEASUREMENT

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-312B 05-6S-BSW4	-1		NASA DATA BASELINE NEW	[ X	]
SUBSYSTEM:	DPS 312 RPC					
LEAD ANALYST:	H J LOWERY	•				
ASSESSMENT:						
CRITICAL FLIGH		DUNDANCY	SCREENS		CIL	
HDW/FU		В		С		
NASA [ 3 /1R IOA [ 3 /1R	] [ P	] ·[P	] [	P ] P ]	[	] *
COMPARE [ /	] [	] [	] . [	]	[	]
RECOMMENDATIONS:	(If diff	ferent fr	om NASA)			
( /	] [	] [	] [	] (A	[ DD/D1	] ELETE)
* CIL RETENTION	RATIONALE:	(If appl:	-	ADEQUATE IADEQUATE		]
REMARKS: THIS NASA FMEA N ANALYSIS. THIS CONSIDERED TO BE "PREMATURE OPERATURE OPERATURE OPERATURE OPERATURE MEASUREMENT DERI IOA DOES CONCUR NOT UPGRADE THE	FAILURE MODE COVERED BY ATION". FLIGHT OF FIGHTS MAY BY VATION IS TOWNED BY THE PROPERTY OF TH	DE "OPEN/O THIS ROO REDUNDANT E ERRONEO INITIATED REEVALUA	CLOSED/F CKWELL F STRINGS US SINCT BY A R	PREMATURE MEA WITH S WHICH IS E THE STAT	OPER FAIL PRO' US IRCU	ATION" IS JRE MODE VIDED BY IT.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/8 DPS-312 05-6S-B	6 C FUS2-1		NASA DATA BASELINE NEW	[ X ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 312 RPC			The street	
LEAD ANALYST:	H J LOW	ERY			
ASSESSMENT:					
CRITICAL: FLIGH		REDUNDAN	CY SCRE	ens	CIL ITEM
	NC	A	В	<b>c</b> ,	1124
NASA [ 3 /lR IOA [ 3 /lR	] .[	P ] [	P ] P ]	[ P ] [ P ]	[ ] *
COMPARE [ /	] [		]	[ ]	
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)	
[ /	] [	] [	. ]	[ ] (A)	[ ] DD/DELETE)
* CIL RETENTION I	RATIONAL	E: (If áp	plicable	e) ADEQUATE INADEQUATE	
THIS NASA FMEA NANALYSIS. THIS CONSIDERED TO BE PREMATURE OPERAVERIFICATION IN THE MDM MEASUREM MEASUREMENT DERI	FAILURE COVERED TION". FLIGHT O ENTS MAY VATION I	MODE "OPE BY THIS F REDUNDA BE ERROI S INITIA	N/CLOSEI ROCKWELI NT STRII NEOUS SI TED BY A	D/PREMATURE L FMEA WITH NGS WHICH IS NCE THE STAT REDUNDANT O	OPERATION" IS FAILURE MODE PROVIDED BY US CIRCUIT.
IOA DOES CONCUR NOT UPGRADE THE				THIS FAIL	URE MODE DID

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/08/80 DPS-313 05-5-B25			NASA DATA: BASELINE [ X ] NEW [ ]			
SUBSYSTEM: MDAC ID: ITEM:	DPS 313 LOAD SWI						
LEAD ANALYST:	H J LOWE	ERY			-		
ASSESSMENT:							
CRITICAL: FLIGHT		REDUNDA	NCY SCREE	ens	CIL ITEM		
HDW/FUI		A	В	C			
NASA [ 3 /1R IOA [ 3 /3	] [	P ] NA]	[ P ] [ NA]	[ P ] [ NA]	[ ] *		
COMPARE [ /N	] (	[и]	[ и ]	[ N ]	[ ]		
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)			
[ /	1	. 1	[ ]	[ ] (A	[ ] .DD/DELETE)		
* CIL RETENTION	RATIONALI	E: (If a	pplicable	e) ADEQUATE INADEQUATE			
REMARKS: DEU'S ARE NOT NOT NEEDED. IOA DOES CONCUR				MISSION. S	•		

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ASSESSME ASSESSME NASA FME	NT I		DPS-	08/86 -314 5-B26-	1-2				NASA BASE	LINE		к ] ]
SUBSYSTEM MDAC ID:	M:		DPS 314 FUNC	CTION	swii	СН		Alema Ja	<del>, T</del>			
LEAD ANA	LYST	:	нј	LOWER	Y							
ASSESSME	NT:										\$ t <sub>1</sub> =	, sua
•	CRIT	ICAL LIGH		R	EDUN	IDANCY	SC	REENS			CII	
= .		W/FU		A		В			C	1	111	iPI
NASA IOA	[ 3 [ 3	/1R /1R		[ P	]	[ P	]	- [	P ] P ]		[	] *
COMPARE	C	/	1	[	]	(	]	[	]		[	]
RECOMMEN	DATI	ons:	(3	f dif	fere	ent fr	om :	NASA)				
٠.	C	/	.]	[	]	[	]	[	]	(AI	[ DD/I	] DELETE)
* CIL RE	TENT:	ION	RATIC	NALE:	(If	appl	ical		ADEQU. ADEQU		[	<u>]:</u> . =
REMARKS: NO DIFFE		ES.	THIS	FAIL	JRE	MODE	DID	тои	UPGRA	DE TH	IE I	TUNCTIONAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/80 DPS-3142 05-5-B20	A.		NASA DAT BASELIN NE	E [ X ]			
SUBSYSTEM: MDAC ID: ITEM:	DPS 314 FUNCTION							
LEAD ANALYST:	H J LOW	ERY						
ASSESSMENT:								
CRITICAL FLIGH	T	REDUNDA	NCY SCRE		CIL ITEM			
HDW/FU	NC	A	В	C				
NASA [ 3 /1R IOA [ 3 /1R	] [	P] P]	[ P ] [ P ]	[ P ] [ P ]	[ ] *			
COMPARE [ /	] [	1	[ ]	[ ]	[ ]			
RECOMMENDATIONS:	(If d	ifferent	from NA	.SA)				
. 1	j (	]	[ ]		[ ] ADD/DELETE)			
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]								
REMARKS: NO DIFFERENCES. CRITICALITY.	THIS FAI	LLURE MO	DE DID N	INADEQUATE OT UPGRADE	THE FUNCTIONAL			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/8 DPS-314: 05-5-B2	В		NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	DPS 314 FUNCTION	n switch			
LEAD ANALYST:	H J LOW	ERY			
ASSESSMENT:					
CRITICAL: FLIGHT HDW/FU	r	REDUNDANO A	EY SCREENS B	c	CIL ITEM
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] [ P ] [	P ] [	P ] P ]	[ ] *
COMPARE [ /	] [	] [	. ] [	]	[ , ]
RECOMMENDATIONS:	(If d	ifferent i	rom NASA)		n news n
	] .[	] [	1 .	[] (AD	[ ] D/DELETE)
* CIL RETENTION I REMARKS: NO DIFFERENCES. CRITICALITY.			IN	ADEQUATE ADEQUATE UPGRADE TH	[ ] [ ] E FUNCTIONAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-315			TA: NE [ X ] EW [ ]
MDAC ID:	DPS 315 DATA BUS COUPI	ER (DBC)		
LEAD ANALYST:	H J LOWERY			
ASSESSMENT:				
CRITICAL FLIGH	Ţ	ANCY SCRE	ENS C	CIL ITEM
HDW/FU		В	_	
NASA [ 2 /lR IOA [ 3 /lR	] [ P ] ] [ P ]	[ P ]	[ P ] [ P ]	[ X ] *
COMPARE [ N /	] [ ]	[ ]	[ ]	_ [ N ]
RECOMMENDATIONS:	(If differen	nt from NA	SA)	
[ /	] [ ]		[ ]	[ ] (ADD/DELETE)
* CIL RETENTION REMARKS:	RATIONALE: (If	applicabl	e) ADEQUAT INADEQUAT	
IOA DOES CONCUR REDUNDANT HARDWA DEORBIT.	RE WOULD NOT BE	ACCESSIB	LE DURING	LIFTOFF AND
IF THE SECOND RE VALVES OR PURGE LOSS OF LIFE/VEH	DURING RTLS ABO ICLE. SIMULTAN	ORT THIS F	'AILURE WOU	JLD RESULT IN
EXCLUDED FROM THE MULTIPLE FAILURE		TENT WITH	THE NSTS 2	22206.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		1-4		NASA DATA BASELINE NEW	[ X ]
	DPS 316 DBIA	mala 100 A			
LEAD ANALYST:	H J LOWER	Y			
ASSESSMENT:					<del></del>
CRITICALI FLIGHT		EDUNDANC	Y SCREENS	;	CIL ITEM
HDW/FUN			В	C '	IIEM
NASA [ 3 /2R IOA [ 3 /2R	] [ P	]. []	NA] [	P ] P ]	[ ] *
COMPARE [ /	] [	] [	1 [,	j	[ ]
RECOMMENDATIONS:	(If dif	ferent f	rom NASA)		
[ /	] [	j (	] · [	] (AI	[ ] DD/DELETE)
* CIL RETENTION F	RATIONALE:	(If app	-	ADEQUATE ADEQUATE	
REMARKS: NO DIFFERENCES. CRITICALITY.	THIS FAIL	URE MODE	DID NOT	UPGRADE TH	E FUNCTIONAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-316A	<b>\</b>			ATA: INE [ X ] NEW [ ]
	DPS 316 DBIA				
LEAD ANALYST:	H J LOWE	ERY			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDAN	CY SCREE	ens	CIL ITEM
HDW/FU		<b>A</b>	В	C	
NASA [ 3 /3 IOA [ 3 /2R	] [	P ] [ P ] [	P ] NA]	[ P ] [ P ]	[ ] *
COMPARE [ /N	] [	1,	[и]	[ ]	[ ]
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)	
. /	1	] [	1	[ ]	[ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE	E: (If ap	plicable		
	, ,			ADEQUA	re [ ] re [ ·]
REMARKS: THIS FAILURE MODE CONSIDERED TO BE "ALL CREDIBLE MODE "ALL CREDIBLE MODE."	COVERED	SHORT/ERI BY THIS	RONEOUS/I	ERRATIC O	UTPUT" IS
THE IOA DOES CON DID NOT UPGRADE	CUR WITH				IS FAILURE MODE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-317			NASA DATA BASELINE NEW		]
MDAC ID:	DPS 317 RESISTOR	R				
LEAD ANALYST:	H J LOW	ERY				
ASSESSMENT:						
CRITICAL: FLIGHT		REDUNDAN	CY SCREE	ens	CIL ITEM	
HDW/FUI		A	В	C	11011	
NASA [ 3 /3 IOA [ 3 /3	] [	P ] [	P ] NA]	[ P ] [ NA]		] <b>*</b> ]
COMPARE [ /	], [	и ]	[и]	[ <b>N</b> ]		]
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)		
[ /	1 (	j (	]	(A)	[ DD/DE	] LETE)
* CIL RETENTION 1	RATIONALI	E: (If.ap	plicable	e) ADEQUATE INADEQUATE		
REMARKS: THE IOA DID NOT OTHE IOA DOES CON	CUR WITH	NASA'S F	EEVALUA'	TION.	3 - 128 - 129 - 129	
ACCORDING TO NST	S 22206, CRITICA	REDUNDAN LITY OF :	ICY SCREI		"NA" (	
				. 1		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-318		NASA D BASEL	
SUBSYSTEM: MDAC ID: ITEM:	DPS 318 RPC			
LEAD ANALYST:	H J LOWERY			
ASSESSMENT:				
CRITICAL: FLIGHT		DANCY SCRE	ENS	CIL ITEM
HDW/FUI		В	C	<b></b>
NASA [ 3 /3 IOA [ 3 /3	] [ P ] ] [ NA]	[ P ] [ NA]	[ P ] [ NA]	[ ] *
COMPARE [ /	] [и]	[ и ]	[ 11 ]	. [ ]
RECOMMENDATIONS:	(If differe	ent from NA	ASA)	
[ /	] [ ]	[ ]	[ ]	[ ] (ADD/DELETE)
* CIL RETENTION I	RATIONALE: (If	applicabl	.e) ADEQUA' INADEQUA'	
REMARKS: THIS FAILURE MODE COVERED BY THIS I OUTPUT".				
NO EFFECT SINCE I DISPLAY WILL NOT NASA AGREED WITH	APPEAR UNTIL THE IOA ASSES	THE DEU IS	TURNED O	n. N.
THE IOA DID NOT OF ACCORDING TO NST. FOR FMEAS WITH A	S 22206, REDUN	DANCY SCRE	IN THE OR EENS MUST	IGINAL ANALYSIS. BE "NA" OR BLANK

ASSESSMI ASSESSMI NASA FMI	ent Ent Ea #	DATE: ID:	10/1 DPS- 05-6	4/86 319 S-BSW4	-2		NASA DATA: BASELINE [ ] NEW [ X ]				
SUBSYSTI MDAC ID: ITEM:	:		319	CH, CR	T POWE	R				, <del>-</del>	
LEAD AND	ALYS'	r:	нј	LOWERY							
ASSESSMI	ENT:										
	]	FLIGH	T	RE					CIL		
				A		B	С				
NASA IOA	[ :	3 /3	]	[ P [ NA	] [	P ] NA]	[ P [ N	] A]	[ .	] * ]	
COMPARE	[	/	]	[ N	] [	N ]	[ N	] .	[	]	
RECOMME	NDAT	ions:	(I	f diff	erent	from N	IASA)				
•	[	/	]	[	] [	]	[	]	[ (ADD/D		)
* CIL RI			RATIO	NALE:	(If app	plicab	A.	DEQUAT DEQUAT	E [ E [	]	
REMARKS: THIS FAL COVERED OPERATIONO EFFECT	LLURI THI: ON".	E MOD S ROC	KWELL	FMEA	WITH F.	AILURE	MODE	"PREM	ATURE		
DISPLAY NASA AGI IOA DID ACCORDIN	WIL REED NOT NG TO	L NOT WITH COVE NST	APPE THE R THI S 222	AR UNT IOA AS: S FAIL 06, RE	IL DEU SESSME URE MC DUNDAN	IS TO NT REC DE IN CY SCR	JRNED OMMEN THE O	ON. DATION RIGINA	I. L ANAL	ysis.	
TOR FRE	n		· CKII		- 41 3	,		-			

SUBSYSTEM: DPS MDAC ID: 320 ITEM: RPC  LEAD ANALYST: H J LOWERY  ASSESSMENT:  CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C  NASA [ 3 /3 ] [ P ] [ P ] [ P ] [ ] * IOA [ 3 /3 ] [ NA] [ NA] [ NA] [ NA] [ ]  COMPARE [ / ] [ N ] [ N ] [ N ] [ ] [ ]  RECOMMENDATIONS: (If different from NASA)  **CIL RETENTION RATIONALE: (If applicable)  **CIL RETENTION RATIONALE: (If applicable)  REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOAD DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-320 05-6S-BRPC5-2	BASELINI NET										
ASSESSMENT:  CRITICALITY REDUNDANCY SCREENS CIL ITEM HDW/FUNC A B C  NASA [ 3 /3 ] [ P ] [ P ] [ P ] [ ] * 10A [ 3 /3 ] [ NA]	MDAC ID:	320											
CRITICALITY REDUNDANCY SCREENS CIL TIEM HDW/FUNC A B C  NASA [ 3 /3 ] [ P ] [ P ] [ P ] [ ] * IOA [ 3 /3 ] [ NA] [	LEAD ANALYST:	H J LOWERY											
FLIGHT HDW/FUNC A B C  NASA [ 3 /3 ] [ P ] [ P ] [ P ] [ ] * IOA [ 3 /3 ] [ NA] [ NA] [ NA] [ NA] [ ]  COMPARE [ / ] [ N ] [ N ] [ N ] [ N ] [ ]  RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	ASSESSMENT:												
NASA [ 3 /3 ] [ P ] [ P ] [ P ] [ ] *  IOA [ 3 /3 ] [ NA] [ NA] [ NA] [ NA] [ ]  COMPARE [ / ] [ N ] [ N ] [ N ] [ N ] [ ]  RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * CIL RETENTION RATIONALE: (If applicable)  REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.													
COMPARE [ / ] [ N ] [ N ] [ N ] [ ]  RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * ADEQUATE [ ]  REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.													
RECOMMENDATIONS: (If different from NASA)  [ / ] [ ] [ ] [ ] [ ]  * CIL RETENTION RATIONALE: (If applicable)  * ADEQUATE [ ]  INADEQUATE [ ]  REMARKS:  THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	NASA [ 3 /3 IOA [ 3 /3	] [ P ] ] [ NA]	[ P ] [ P ] [ NA] [ NA] ,	[ ] *									
[ / ] [ ] [ ] [ ] (ADD/DELETE)  * CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ ]  REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	COMPARE [ /	] [и]	[и] [и]	[ ]									
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ ] REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	RECOMMENDATIONS:	(If differen	nt from NASA)										
ADEQUATE [ ] INADEQUATE [ ] REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT". NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY. IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	[ /	] [ ]											
THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT".  NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY.  IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS.  NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	* CIL RETENTION	RATIONALE: (If	ADEQUATE	•									
NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.	REMARKS: THIS FAILURE MODE "PREMATURE OPERATION" IS CONSIDERED TO BE COVERED BY THIS ROCKWELL FMEA WITH FAILURE MODE "INADVERTENT OUTPUT". NO EFFECT SINCE DEU WILL HAVE POWER APPLIED PREMATURELY.												
ACCORDING TO NSTS 22206, REDUNDANCY SCREENS MUST BE "NA" OR BLANK FOR FMEAS WITH A CRITICALITY OF 3/3.													

ASSESSME ASSESSME NASA FME	NT TD.	"בפתח	וכו	[01-2	(NE	:W)		NASA BASE	DATA LINE NEW	[	]	
SUBSYSTEM MDAC ID:		321										
LEAD ANA	LYST:	н ј 1	LOWER	Y								
ASSESSME	NT:											
•	CRITICA:		R	EDUN	DANC	Y SCF	REENS			CIL		
		UNC	A			В	(	2	5		•	
NASA IOA	[ 3 /3	. ]	( N	A] A]		NA] NA]	[ ]	NA] NA]		[	]	<u> </u>
COMPARE	[ /	1	[	]	٠, [	]	_ [	1.	-	(	]_	tautee
RECOMMEN	DATIONS	: (I	f dif	fere	nt f	rom 1	VASA)					
	[ /	1	[	j	Γ	]	[	]	(A	[ DD/D	] ELET	E)
* CIL RE	TENTION	RATIO	NALE:	(If	app	licab		ADEQU ADEQU	ATE ATE	[	]	
REMARKS: IOA DID I NASA AGRI ACCORDING	EED WITH	H THE I	OA A	SSESS EDUN	MEN DANC	T REC	SINAL OMME	ANAI CTADN	LYSIS	≒		BLANK
FOR FMEA	2 MITH	A CRIT	TCALI	TY O	r 3/	٥.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DDC-222			NASA DATA BASELINE NEW							
MDAC ID:	DPS 322 SWITCH,	CRT POWER									
LEAD ANALYST:	H J LOW	ERY									
ASSESSMENT:											
CRITICAL: FLIGH		REDUNDANCY	SCREENS		CIL ITEM						
=	йC	A B	(	2							
NASA [ 3 /1R IOA [ 3 /1R	] [	P ] [ P		? ] ? ]	[	] <b>*</b> ]					
COMPARE [ /	] . [	] [	] [	]	[ .	]					
RECOMMENDATIONS:	(If d	lifferent fr	om NASA)								
[ /	] [	] [	] [	] (A	[ DD/DE	] :LETE)					
* CIL RETENTION	RATIONAL	E: (If appl		ADEQUATE ADEQUATE	[	]					
REMARKS: REF. 05-6Q-2201-3. NASA-JSC FMEA & CIL REVIEW COMMENTS, 9-11-86. IOA DID NOT COVER THIS FAILURE MDOE IN THE ORIGINAL ANALYSIS. IOA DOES CONCUR WITH NASA'S REEVALUATION.											

ASSESSME ASSESSME NASA FME	D:	10/10/86 DPS-400 05-5-B04-2-1				NASA DATA: BASELINE [ X ] NEW [ ]									
SUBSYSTEM MDAC ID:	M:		DPS 400 Tape transport mechanism												
LEAD ANA	LYST	:	к. 1	Piet	z										
ASSESSMEN	SSESSMENT:														
C	F	ICALI LIGHT W/FUN	C		RE A	DUND		y s B	CREE		C	vor vor jag in ta	CIL		
NASA IOA		-		]	P P	]	[ ]	P :	]	[	P]		[	]	*
COMPARE	[ .	/	]	[	•	]	[		]	[	]	•	[	]	
RECOMMEN	DATI	ons:	(:	If d	ifi	feren	t f	roi	m NAS	A)					
	[	/	]	[		1	(	•		[	]	(Al	[   	] ELF	ETE)
* CIL RET		ION F		NAL	E:	(If a	app.	lio				QUATE QUATE	[	]	

NO DIFFERENCES.

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M	UBSYSTE IDAC ID: TEM:	M:		DF 40 Ta	1	tra	ans	spor	t me	ch	anis	m						
I	LEAD ANALYST:				Pi	etz	Z											
A	SSESSME	NT:														-		
	ı	ICAL		REDUNDANCY SCREENS						CIL ITEM								
HDW/FU						A		1	В			С						
	NASA IOA	[ 3 [ 3	/2R /2R	]		[	P P	]	[ ] [ ]	P P	]	[ [	P P	]		[	]	*
C	OMPARE	[	/	]		[		]	[		] -	(		]		[	]	•
R	ECOMMEN	DATI	ons:		(If	đ:	if:	fere	ent f	ro	m NA	SA	)					
-		ָנ	/	]		[		]	[		]	[		1	(AE	[ D/:	DEL:	ETE
	CIL RE	TENT	ION :	RAT	'ION	ALI	€:	(If	app:	li	cabl			EQUAT		[	]	
R	EMARKS:																	

NO DIFFERENCES.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/10/86 DPS-402 05-5-B04-2-1	NASA DATA: BASELINE [ X ] NEW [ ]										
	DPS 402 Read electronics											
LEAD ANALYST:	K. Pietz											
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C												
HDW/FU	NC A B	C										
NASA [ 3 /2R   IOA [ 3 /2R	[P] [P] [P] [	P ] * [ ] * P ]										
COMPARE [ /	] [ ] [ ] [	] [ ]										
RECOMMENDATIONS:	(If different from NASA)											
[ /	[ / ] [ ] [ ] (ADD/DELETE)											
* CIL RETENTION : REMARKS: NO DIFFERENCES.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/10/86 DPS-403 05-5-B04-2	-1	NASA DATA: BASELINE [ X ] NEW [ ]				
SUBSYSTEM: MDAC ID: ITEM:	DPS 403 Read elect	ronics					
LEAD ANALYST:	K. Pietz						
ASSESSMENT:							
CRITICAI FLIGH HDW/FU	T						
·			_	r 1 4			
NASA [ 3 /2F IOA [ 3 /2F	R ] [ P	] [ P	] [P]	[ ] *			
COMPARE [ /	] [	] [	] [ ]	[ ]			
RECOMMENDATIONS	: (If diff	erent fro	om NASA)	•			
[ /	) [	) [	] [ ]	[ ] (ADD/DELETE			
* CIL RETENTION REMARKS:	RATIONALE:	(If appli		QUATE [ ] QUATE [ ]			

NO DIFFERENCES.

ASSESSMENT DAT ASSESSMENT ID: NASA FMEA #:	DPS-4			NASA DA BASELII N									
SUBSYSTEM: MDAC ID: ITEM:	DPS 404 MIA			• 									
LEAD ANALYST:	K. Pie	etz											
ASSESSMENT:	SSESSMENT:												
FLI	ALITY GHT FUNC	REDUNE A	ANCY SCI B	REENS	CIL ITEM								
UDW/	FUNC	A	Ð	<b>C</b>									
NASA [ 3 /	2R ] 2R ]	[ P ] [ P ]	[ P ] [ P ]	[ P ]	[ ] *								
COMPARE [	<b>'</b> ]	[ ]	[ ]	[ ]	[ ]								
RECOMMENDATION	s: (If	differer	nt from 1	NASA)									
[ /	]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)								
* CIL RETENTIO  REMARKS: NO DIFFERENCES		ALE: (If	applicat	ole) ADEQUATI INADEQUATI									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/10/86 DPS-405 05-5-B04-2-1	NASA DATA: BASELINE [ X ] NEW [ ]					
SUBSYSTEM: MDAC ID: ITEM:	DPS 405 MIA						
LEAD ANALYST:	K. Pietz						
ASSESSMENT:							
CRITICAL FLIGH HDW/FU	T	screens C	CIL ITEM				
NASA [ 3 /2R IOA [ 3 /2R	[P] [P] [P]	] [P] ] [P]	[ ] *				
COMPARE [ /	] [][	] [ ]	[ ]				
RECOMMENDATIONS:	: (If different from	m NASA)					
. 1	] [] [	] [ ] (A	[ ] DD/DELETE				
* CIL RETENTION  REMARKS: NO DIFFERENCES.	RATIONALE: (If applie	cable) ADEQUATE INADEQUATE	[ ]				

ASSESSMEI ASSESSMEI NASA FME	I TN	ATE: D:	10/10/86 DPS-406 05-5-B04-2-1					NASA DATA: BASELINE [ X ] NEW [ ]						
SUBSYSTER MDAC ID:	м:		DPS 406 Write electronics											
LEAD ANA	<b>!:</b>	K. Pietz												
ASSESSMEN	SSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C														
	עת	W/FUI	NC.		A		E							
NASA IOA	[ 3	/·2R /2R	]	[	P ]		[ F	]	[	P]	,	[	] ;	k
COMPARE	[	/	1	[	•	]	[	]	[	]		[	]	
RECOMMEN	DATI	ons:	(	If d	iffe	eren	t fr	om N	IASA)					
	[	/	]	[	]		[	]	[	]	(A	[ DD/D	] ELE!	ΓE)
REMARKS:	CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ ]													
NO DIFFE	RENC	CES.	•			•							•	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/10/86 DPS-407 05-5-B04-2-1	NASA DATI BASELINI NEV	[ X ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 407 RPC		
LEAD ANALYST:	K. Pietz		
ASSESSMENT:			
CRITICALI FLIGHT HDW/FUN		CY SCREENS B C	CIL ITEM
·			
NASA [ 3 /2R IOA [ 3 /2R	] [P] [ ] [P] [	P ] [ P ] P ] [ P ]	[ ] *
COMPARE [ /	) [ ] [	] [ ]	[ ]
RECOMMENDATIONS:	(If different	from NASA)	
	] ( ] (	] [ ] (2	[ ] ADD/DELETE
* CIL RETENTION I REMARKS: NO DIFFERENCES.	RATIONALE: (If app	plicable) ADEQUATE INADEQUATE	[ ]

ASSESSME ASSESSME NASA FME	NT :	ID:	DP	/10/ S-40 -6S-	8	W2-1					NASA DA BASELI N		[ X	]
SUBSYSTE MDAC ID: ITEM:	M:	-	DP 40 Sw											
LEAD ANA	LYS	r:	ĸ.	Pie	tz									
ASSESSME	NT:													
		rical Fligh			1	REDUI	NDANC	Y :	SCRI	EENS			CIL ITEM	1
	HI	OW/FU	NC		7	A		В			C TERR	ž:		
NASA IOA	[ 3	3 /2R 3 /2R	]		[ ]	? ] ? ]	[	P P	]	[	P ] P ]		[	] <b>*</b>
COMPARE	[	/	]		[	]	[		]	[	1		[	]
RECOMMEN	DAT:	ions:		(If	di:	ffer	ent f	ro	m NZ	ASA)				
	[	1	]	• .	[	]	]		]	[	]	(ADI	[ D/DF	] ELETE)
* CIL RE	TENT	rion :	RAT:	IONA	LE:	(If	app	ļi	cab l	an di Erwello	ADEQUATI ADEQUATI		[	]
REMARKS:	יספיא	CEC							-		UDDZOWI.	•	L	u Taran san

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [ ] NEW [ X ]				
	DPS 409 Switch					
LEAD ANALYST:	K. Pietz					
ASSESSMENT:						
CRITICAL: FLIGHT	ITY REDUNDANCY SCREEN	NS CIL ITEM				
HDW/FUI	<del>-</del>	C				
NASA [ 3 /3 IOA [ 3 /3	] [P] [P] ] [NA] [NA]	[ P ] [ ] * [ NA] [ ]				
COMPARE [ /	] [и] [и]	[и] [ј				
RECOMMENDATIONS:	(If different from NAS	A)				
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* CIL RETENTION RATIONALE: (If applicable)						
DEMA DIZZ.	:	ADEQUATE [ ] INADEQUATE [ ]				
REMARKS: ACCORDING TO NSTS 22206, REDUNDANCY SCREENS MUST BE "NA" OR BLANK FOR FMEAS WITH A CRITICALITY OF 3/3. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-410 05-5-B04					ASA DATA BASELINE NEW	[ ]	K ]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 410 Control	logic							
LEAD ANALYST:	K. Pietz								
ASSESSMENT:									
CRITICAI FLIGH HDW/FU	T	REDUNI A	DANCY B	SCREE	ns C	- १९ <u>वास्त</u>	CIT		
NASA [ 3 /2F IOA [ 3 /2F		P ] P ]	[ P	]	[ P	]	[	]	*
COMPARE [ /	. ] [	1	[	,1	[ .	J .	[	]	
RECOMMENDATIONS:	(If di	ffere	nt fr	om NAS	A)				
[ /	] [	.]	[	1	[		[ DD/I	] DELE	TE)
* CIL RETENTION  REMARKS: NO DIFFERENCES.	RATIONALE	: (If	appli	icable	Al	DEQUATE DEQUATE	[	]	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-411 05-5-B04-2	-2		ASA DATA: BASELINE NEW	[ X ]	
SUBSYSTEM: MDAC ID: ITEM:	DPS 411 Control lo	gic				
LEAD ANALYST:	K. Pietz					
ASSESSMENT:						
CRITICAL FLIGH		DUNDANCY	SCREENS		CIL ITEM	
HDW/FU	NC A	В	С	•		
NASA [ 3 /2R IOA [ 3 /2R		] [ P ] [ P	] [ P	]	[ ] *	-
COMPARE [ /	] [	] [	] [	] .	[ ]	
RECOMMENDATIONS:	(If diff	ferent fr	om NASA)		•	
[ /	1 . [	J [,	j (	] (A)	[ ] DD/DELETI	E
* CIL RETENTION  REMARKS: NO DIFFERENCES.	RATIONALE:	(If appl:	A	DEQUATE DEQUATE		

ASSESSMEN ASSESSMEN NASA FMEA	T ID:	10/14/86 DPS-412 05-5-B04				NASA DATA BASELINE NEW	[ X ]
SUBSYSTEM MDAC ID: ITEM:		DPS 412 Power su	pply				
LEAD ANAL	YST:	K. Pietz	:				
ASSESSMEN	T:						
C		TY	REDUNDA	NCY	SCREEN	s	CIL ITEM
	FLIGHT HDW/FUN		A	В		<b>C</b>	IIEM
NASA IOA	[ 3 /2R [ 3 /2R	] [	P ] P ]	[ P	] [	P ] P ]	[ ] *.
COMPARE	[ /	] [	1	[	] [	. ]	[ ]
RECOMMEND	ATIONS:	(If di	ifferent	fro	om NASA	.)	
	[ /	1 t.	1	[	] [	[A]	[ ] DD/DELETE)
* CIL RET	ENTION F	RATIONALE	: (If a	ppli		ADEQUATE NADEQUATE	
						", IS CONST MODE, "LOS	IDERED TO BE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-413	NASA DATA: BASELINE [ X ] NEW [ ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 413 RESISTOR, CURRENT LIMITER	
LEAD ANALYST:	B. ROBB	
ASSESSMENT:		
FLIGHT		ITEM
HDW/FUN	NC A B	С
NASA [ 3 /2R IOA [ 3 /2R	] [P] [P] [ ] [P] [P]	P ] [ ] * P ]
COMPARE [ /	] [ ] [ ] [	] [ ]
RECOMMENDATIONS:	(If different from NASA	<b>)</b> .
	1 [ 1 [	] [ ] (ADD/DELETE)
* CIL RETENTION I	RATIONALE: (If applicable)	ADEQUATE [ ]
REMARKS:	I1	NADEQUATE [ ]
NO DIFFERENCES. ANALYSIS. THE EN	IOA DID NOT COVER THIS IT FFECTS OF THIS FAILED ITEM AC ID. 408, A SWITCH WHICH	COULD BE CONSIDERED TO

RESISTOR.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/30/86 DPS-414 05-6S-BR			NASA DATA BASELINE NEW	[ X ]
SUBSYSTEM: MDAC ID: ITEM:	DPS 414 CONTROLL	ER, REMO	TE POWE	R	
LEAD ANALYST:	H J LOWE	RY			
ASSESSMENT:					was to the way
CRITICAL FLIGH		REDUNDAN	CY SCRE	ens	CIL ITEM
HDW/FU		A	В	c Parallini	****
NASA [ 3 /2R IOA [ 3 /2R	] [	P ] [	P ] P ]	[ P ] [ P ]	[]*
COMPARE [ /	] [	. ] [	]	[ ]	[ ]
RECOMMENDATIONS:	(If di		from NA		
ţ	j	] [		[ ]	[ ] DD/DELETE)
* CIL RETENTION	RATIONALE	: (If ap	plicable	e) ADEQUATE INADEQUATE	[ ]
REMARKS: NO DIFFERENCES. ANALYSIS.	IOA DID 1	OT COVE	R THIS	FAILURE IN T	HE ORIGINAL

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-415		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	DPS 415 IPL Source Swi	itch		
LEAD ANALYST:	T. B. Cribbs			
ASSESSMENT:				
FLIGH			-	CIL ITEM
HDW/FU	NC A	В	C	
NASA [ 2 /2 IOA [ 3 /3	] [P] ] [NA]	[ P ] [ NA]	[ P ] [ NA]	[ X ] *.
COMPARE [ N /N	] [и]	[ N ]	[ N ]	[ N ]
RECOMMENDATIONS:	(If differen	nt from NAS	5 <b>A</b> )	·
[ /		[ ]	[ ] (A	[ ] .DD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicable	e) ADEQUATE INADEQUATE	[ X ]
REMARKS: IOA CRITICALITY LOAD IS COMPLETE HAVE TO OCCUR BE GPC.	A SYSTEMS SOFT	TWARE PROBI	LEM OF SOME	TYPE WOULD
SIMULTANEOUS DIS MULTIPLE FAILURE ACCORDING TO NST FOR FMEAS WITH F IOA DOES CONCUR	S ARE INCONSIS'S 22206, REDUN A CRITICALITY O	TENT WITH DANCY SCREET	NSTS 22206. ENS MUST BE	"NA' OR BLANK
TOA DOES CONCUR	MIIN NASA'S KE	ANDONITON	WID WITONS	•

	DPS-416	PS-416 BASELINE [ ]					
	DPS 416 CONTROLLER, R	EMOTE POWER					
LEAD ANALYST:	T. B. Cribbs						
ASSESSMENT:							
	TY REDUN	DANCY SCREEN	s	CIL			
FLIGHT HDW/FUN	C A	В	C	ITEM			
NASA [ 3 /3 IOA [ 3 /3	] [ NA] ] [ NA]	[ NA] [ NA] [	NA]	[ ] *			
COMPARE [ /	1	[ ] [	]	<b> 1</b>			
RECOMMENDATIONS:	(If differe	nt from NASA	) ·				
. [ /	] [ ]	[ ] [	] (AI	[ ] DD/DELETE)			
* CIL RETENTION F	RATIONALE: (If		ADEQUATE	[ ]			
DEMARKS.		I	NADEQUATE				
REMARKS: IOA DID NOT COVER THIS FAILURE MODE IN THE ORIGINAL ANALYSIS. ACCORDING TO NSTS 22206, REDUNDANCY SCREENS MUST BE "NA" OR BLANK FOR FMEAS WITH A CRITICALITY OF 3/3. NASA AGREED WITH THE IOA ASSESSMENT RECOMMENDATION.							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-417		-	NASA DATA BASELINE NEW		]
SUBSYSTEM: MDAC ID: ITEM:	DPS 417 SWITCH, I	IPL				
LEAD ANALYST:	H J LOWER	RY				
ASSESSMENT:						
CRITICAL FLIGH	T	REDUNDANC		rs C	CIL	4
HDW/FU	NC F	A	В	C		
NASA [ 3 /2R IOA [ 3 /2R	] [1	P ] [ ]	P ] (	P ] P ]	[	] *
COMPARE [ /	] [	] [	] [	[ ]	1	1
RECOMMENDATIONS:	(If di	fferent f	rom NASA	<b>A</b> )		
[ /	] [	] [	] [	] (A	[ .DD/D1	] ELETE)
* CIL RETENTION	RATIONALE:	: (If app	·	ADEQUATE NADEQUATE	_	]
REMARKS: REF. 05-5-B16-1- IOA DID NOT COVE NASA AGREED WITH	R THIS IT	EM IN THE	ORIGIN	AL ANALYSIS		9-19-86

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DDC_EA1	10/14/86 NASA DATA: DPS-501 BASELINE [ 05-5-B08-1-1 NEW [				
MDAC ID:	DPS 501 CIA		<del>-</del>			
LEAD ANALYST:	B. ROBB			T)		
ASSESSMENT:						
CRITICAL: FLIGH		ICY SCREENS		CIL ITEM		
HDW/FU	<del>-</del>	В	3	111M		
NASA [ 2 /lR IOA [ 3 /lR	] [P] [P]	[F] []	P ]	[ X _ ] * *		
COMPARE [ N /	j [ ]	[ 11 ]	]	[ <b>N</b> ]		
RECOMMENDATIONS:	(If different	from NASA)				
[ /	] [ ] [	. 1	] (AI	[ ] DD/DELETE)		
* CIL RETENTION	RATIONALE: (If ap		ADEQUATE ADEQUATE	[ ]		
CHANNEL", COULD I B08-1-1 WITH FAI IOA DOES CONCUR	E, "LOSS OF OUTPU BE CONSIDERED TO LURE MODE, "NO O WITH NASA'S REEVA DEQUATE BECAUSE I	T TO MAIN I BE COVERED UTPUT". LUATION.	ENGINE ON BY ROCKWE	ONE ELL 05-05- ETENTION		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/8 DPS-502 05-5-B0	}		BASELIN	ASA DATA: BASELINE [ ] NEW [ X ]				
	DPS 502 MIA								
LEAD ANALYST:	B. ROBE	3							
ASSESSMENT:									
CRITICAL - FLIGH		REDUND	ANCY SCRE	EENS	CIL ITEM				
HDW/FU		A	В	C					
NASA [ 2 /1R IOA [ 3 /1R	] [	P ]	[ F ] [ P ]	[ P ] [ P ]	[ X ] *				
COMPARE [ N /	1	[ ]	[ N ]	[ ].	[ N ]				
RECOMMENDATIONS:	(If d	differen	t from N	ASA)					
[ //	] (	. 1	[ ]	·[ ] (	[ ] ADD/DELETE				
* CIL RETENTION	RATIONAI	E: (If	applicabl	Le) ADEQUATE INADEQUATE					
REMARKS: IOA DOES CONCUR RATIONALE IS INA				N. THE CIL OT YET AVIAI					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-503 05-5-B08	6 NASA DATA: BASELINE [ ] B-1-1 NEW [ X ]								
MDAC ID:	DPS 503 POWER CO	NTROL SWI	TCH	av.	*L.1.					
LEAD ANALYST:	B. ROBB									
ASSESSMENT:	ASSESSMENT:									
		REDUNDANC	Y SCREENS		CIL					
FLIGHT HDW/FUN		A	В	<b>c</b>	ITEM					
NASA [ 2 /1R IOA [ 3 /1R	] [	P ] [ P ] [	F ] [ P ] [	P ] P ]	[ ] *					
COMPARE [ N /	] [	,	<b>N</b> ] (	]	[ ]					
RECOMMENDATIONS:	(If di	.fferent f	rom NASA	)						
( /	] [	. ] (	) [	] (AI	[ ] DD/DELETE)					
* CIL RETENTION F	RATIONALE	: (If app		ADEQUATE NADEQUATE						
REMARKS: THIS FAILURE MODI CHANNELS", IS CON WITH THIS FAILURE IOA DOES CONCUR TO RATIONALE IS INAI	E, "LOSS ISIDERED E "LOSS C WITH NASA	TO BE COV F REDUNDA L'S REEVAL	TO MAIN ERED BY I ANT POWER WATION.	ENGINE ON ROCKWELL 05 SUPPLIES" THE CIL RE	ALL COMMAND 5-5-B08-1-1 ETENTION					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-504 05-5-B08	5 3-1-1		BASELINE	NASA DATA: BASELINE [ ] NEW [ X ]			
SUBSYSTEM: MDAC ID:	DPS 504	L POWER S						
LEAD ANALYST:	B. ROBB	B. ROBB						
ASSESSMENT:								
FLIGHT		REDUNDANO A	CY SCREE	ns C	CIL			
NASA [ 2 /1R IOA [ 3 /1R	] [	P ] [ P ] [	F ] P ]	[ P ] [ P ]	[ X ] *			
COMPARE [ N /	] [	1	иј	[ ]	[ <b>N</b> ]			
RECOMMENDATIONS:	(If di	ifferent	from NAS	A)				
[ /	) (	] [	1	[ ] (A	[ ] DD/DELETE)			
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ] INADEQUATE [ X ]								
REMARKS: THIS FAILURE MODE, "LOSS OF OUTPUT TO MAIN ENGINE ON ALL COMMAND CHANNELS", IS CONSIDERED TO BE COVERED BY ROCKWELL 05-5-B08-1-1, WITH THIS FAILURE "LOSS OF REDUNDANT POWER SUPPLIES". IOA DOES CONCUR WITH NASA'S REEVALUATION. THE CIL RETENTION RATIONALE IS INADEQUATE BECAUSE IT IS NOT YET								
AVAILABLE.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-505			SA DATA: ASELINE NEW					
MDAC ID:	DPS 505 CONTROLL	LER INTERFAC	E ADAPTER						
LEAD ANALYST:	B. ROBB	B. ROBB							
ASSESSMENT:									
CRITICAL FLIGH HDW/FU	r	REDUNDANCY A B	SCREENS C		CIL ITEM				
NASA [ 2 /1R IOA [ 3 /1R		P ] [ F P	] [ P	]	[ X ] *				
COMPARE [ N /	1 . [	] [ N	] [	]	[ N ]				
RECOMMENDATIONS:	(If di	ifferent fro	om NASA)						
[ /	] [	) [	] [	] (AD	[ ] D/DELETE)				
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ X ]									
REMARKS: THIS FAILURE MODE, "LOSS OF OUTPUT ON STATUS OF ENGINES", IS- CONSIDERED TO BE COVERED BY ROCKWELL 05-5-B08-1-1, WITH THIS FAILURE MODE "NO OUTPUT". IOA DOES CONCUR WITH NASA'S REEVALUATION.									
THE CIL RETENTION RATIONALE IS INADEQUATE BECAUSE IT IS NOT YET AVAILABLE.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	10/14/86 DPS-506 05-5-B08-1-1		NASA DATA BASELINE NEW	[ X ]
SUBSYSTEM: MDAC ID:	DPS 506 OIE			
LEAD ANALYST:	B. ROBB			
ASSESSMENT:				
CRITICAL: FLIGH		INDANCY SCREET	NS	CIL ITEM
	NC A	В	C	
NASA [ 2 /1R IOA [ 3 /3	] [ P ] ] [ NA]	[ F ] [ NA]	[ P ] [ NA]	[ ] *
COMPARE [ N /N	] [ N ]	[ N ]	[и]	[ ]
RECOMMENDATIONS:	(If diffe:	rent from NAS	A)	·
[ /	] [ ]	t j	[ ] (A	[ ] .DD/DELETE)
* CIL RETENTION	RATIONALE: ()	•	ADEQUATE	[ ]
REMARKS: NASA/RI DID NOT OUTPUT TO S-BAND THIS FAILURE MOD 05-5-B08-1-1, WI	, MAINTENANCE IS CONSIDE	COVER THIS F E RECORDS, AN RED TO BE COV	AILURE MODE ID LPS T-O U ERED BY ROC	E, "LOSS OF JMBILICAL".

ASSESSMEN ASSESSMEN NASA FME	I TN	D:	10/16/86 DPS-507 05-6S-BCKT1-1						NASA DATA: BASËLINE [ ] NEW [ X ]								
SUBSYSTEM MDAC ID: ITEM:	<b>1</b> :		DPS 507 CIRCUIT, EIU POWER														
LEAD ANA	LYST	<b>!:</b>	в. 1	3. ROBB													
ASSESSMEN	ASSESSMENT:																
	F	ICAL: LIGH W/FUI	Γ		R:		IDANC	CY SCREENS B C						CIL ITEM			
	•••	,			••			_									
nasa Ioa	[ 2	/1R /1R	]	[	P P	]	[	F F	]		[ P	]		[ ]	( ) ( )	# 	ŧ
COMPARE	[	/	]	-	[	1	[		1.	•	[	]		[	]		
RECOMMEN	DATI	ons:	(	If d	lif	fere	ent i	fr	om i	NAS	A)		-				
	[	/	]	[		]	[		]	•	[	]	(A	[ DD/I	) EI	LEI	E)
* CIL RET	CENT	ION I	RATIO	IANC	E:	(If	app	1:	ical	ble	2)	12	- 4:- 1:				
* CIL RETENTION RATIONALE: (If applicable)  ADEQUATE [ ]  INADEQUATE [ X ]																	
REMARKS: NO DIFFERENCES. IOA DID NOT COVER THIS ITEM IN ORIGINAL ANALYSIS. IOA DOES CONCUR WITH THE NASA REEVALUATION. THE CIL RETENTION RATIONALE IS INADEQUATE BECAUSE IT IS NOT YET AVAILABLE.																	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DPS-508	)		SA DATA: ASELINE [ ] NEW [ X ]
	DPS 508 EIU			
LEAD ANALYST:	H J LOWERY			
ASSESSMENT:				
CRITICAL FLIGH	ITY REI	DUNDANCY	SCREENS	CIL ITEM
HDW/FU		В	С	222.
NASA [ 1 /1 IOA [ 1 /1	] [ P	] [ F ] [ F	] [ P	[ X ] * [ X ]
COMPARE [ /	] [	] [	] [	] [ ]
RECOMMENDATIONS:	(If diff	erent fro	om NASA)	
[ /	] [	] [	] [	[ ] (ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If appli	AD:	EQUATE [ ] EQUATE [ X ]
NASA AGREED WITH THE RETENTION RA	THE IOA ASS	SESSMENT INADEQUAT	IN THE OR RECOMMEND TE BECAUSE	IGINAL ANALYSIS.

ASSESSMENT DATE: 11/03/8 ASSESSMENT ID: DPS-509 NASA FMEA #: EIU-2 (							W)								DAT LIN: NE		x	]		
SUBSYSTEM: DPS MDAC ID: 509 ITEM: SWITCH,						P	OWER	₹.												
LEAD ANA	LYS	T:		H	J L	נשכ	ER	ľ												
ASSESSME	NT:	;										-								
	CRI		CAL				RI	EDUN	ND#	NC	CY	SCI	REENS	3				IL ren	r.	
	FLIGHT HDW/FUNC					A B						С			4.	ITEM				
NASA IOA	[	1	/1 /1	]		[	P P	]		[	F F	]	]	P P	]		[	X X	]	*
COMPARE	[		/	].		[		]		[		]	[		]	•	[		]	·
RECOMMEN	DA:	ric	SMC:		(If	đ:	i.f	fere	ent	: :	fro	om 1	(ASA	)			_			
	[		/	]		[		]		[		]	[		]	(2	[ ADD,	/DI	] ELE	ETE)
* CIL RE	TEN	TI	:ON 1	RAT	ION	ALI	E:	(If	a	pp	1 i	cab				ATE	֚֓֞֞֞֞֞֞֜֞֟֞֜֞֩֓֓֓֓֓֓֓֓֓֓֓֓֓	v	j	
REMARKS:		-											TI	MAI	JEQU	ATE	Ĺ	Х	J	
IOA DID	гои	. c	OVE	R T	HIS	F	AI:	LURI	E 1	10	ĎΕ	IN	THE	0	RIG	INAL	ÄN	ΑĽ	YS	IS.
NASA AGR																				
THE CIL																				
AVAILABL	E.	1	CHIS	IS	A 1	NE	W ]	FME2	A ]	PR.	ES:	ENT	ED A'	r '	THE	DPS	PR	EB	OA	RD.

### APPENDIX D

CRITICAL ITEMS

APPENDIX D CRITICAL ITEMS

NASA FMEA	IDA ID	ITEM NAME	FAILURE MODE
MDM  * 05-5 -B03-1-1 05-5 -B03-1-2  * 05-5 -B03-2-1 05-5 -B03-2-2 05-5 -B03-5-1 05-5 -B03-5-2 % 05-65-BRES3-1 % 05-65-BSW3 -1 % 05-65-BSW5 -3	120 122 108 107 141 142 190 191 193	FA MDM FA MDM FF MDM FF MDM PF MDM PF MDM RESISTOR RPC SWITCH SWITCH	LOSS OF OUTPUT LOSS OF OUTPUT LOSS OF OUTPUT LOSS OF OUTPUT LOSS OF OUTPUT COSS OF OUTPUT OPEN LOSS OF OUTPUT PREMATURE OPERATION FAILS-TO-TRANSFER
GPC  * 05-5 -B01-1-1  * 05-5 -B02-1-1  05-5 -B02-1-3  % 05-5 -B17-1-1  % 05-6S-BDIOX-1  % 05-6S-BSW1 -3	205 201 225 210 230 217	CPU IOP IOP SWITCH DIODE SWITCH	LOSS OF OUTPUT LOSS OF OUTPUT ERRONEOUS OUTPUT LOSS OF OUTPUT FAILS OPEN FAILS OPEN
MCDS 05-5-B22-1-1 05-5-B23-1-3 % 05-5-B24-1-1	300 307 300	SWITCH KBD ADAPTER SWITCH	ERRONEOUS OUTPUT ERRONEOUS OUTPUT FAILS OPEN
DBC 05-5-814-1-1	315	DBC	FAILS OPEN/SHORT
MMU 05-5-B20-1-1	415	SWITCH	FAILS-TO-TRANSFER
EIU % EIU-1 % EIU-2 % 05-5 -B08-1-1 % 05-65-BCKT1-1	508 509 501 507	EIU SWITCH CIA POWER CKT	ERRONEOUS OUTPUT SHORT-TO-GROUND NO OUTPUT FAILS OPEN/SHORT

NOTE \* IOA ISSUE % ADDED TO CIL POST 51-L

#### APPENDIX E DETAILED ANALYSIS

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

# LEGEND FOR IOA ANALYSIS WORKSHEETS

#### Hardware Criticalities:

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

#### Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which,
   if failed, could cause loss of life or vehicle.
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission.

#### Redundancy Screen A:

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

#### Redundancy Screens B and C:

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

# INDEPENDENT ORBITER ASSESSMENT ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R

MDAC ID: 100 ABORT: 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 (FF1..4)

4)

5)

6)

7)

9)

#### CRITICALITIES

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

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.

#### REFERENCES:

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE: 3/1R FLIGHT: SUBSYSTEM: DPS 3/1R ABORT:

101 MDAC ID:

MDM FF1, FF2, FF3, FF4 FAILURE MODE: Loss of Output to LRU

SUBSYS LEAD: B. Robb LEAD ANALYST: W. A. Haufler

## BREAKDOWN HIERARCHY:

1) DPS

2) Multiplexer-DeMultiplexers (MDM)

Flight critical Forward MDM (FF1..4) 3)

4)

ITEM:

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:	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 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 FLIGHT: 3/1R

SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 102

MDM FF1,FF2,FF3,FF4

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 Forward MDM (FF1..4)

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:	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 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 103 ABORT: 3/1R

ITEM: MDM FF1,FF2,FF3,FF4

FAILURE MODE: Erroneous Output to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- 3) Flight critical Forward MDM (FF1..4)
- 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:	3/2R	AOA:	3/1Ř
DEORBIT:	3/1R	ATO:	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 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 104 ABORT: 3/1R

ITEM: MDM FF1,FF2,FF3,FF4

FAILURE MODE: Premature Operation to GPC

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
  - ) Flight critical Forward MDM (FF1..4)
- 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:	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 1,2,3,2

PART NUMBER: MC615-0004-6110,5110

CAUSES: Vibration, Corrosion, Contamination

## 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 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 105 ABORT: 3/1R

ITEM: MDM FF1, FF2, FF3, FF4

FAILURE MODE: Premature Operation to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- 3) Flight critical Forward MDM (FF1..4)
- 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:	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 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.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE: 3/1R FLIGHT: SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 106

ITEM:

MDM FF1, FF2, FF3, FF4

FAILURE MODE: Selected All Channels Wrong

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- 3) Flight critical Forward MDM (FF1..4)
- 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:	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 1,2,3,2

PART NUMBER: MC615-0004-6110,5110

Vibration, Corrosion, Contamination CAUSES:

## 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 use of IMU torquing, forward RCS jets, Hand Controls (THC,RHC), most switches and indicators.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 107 ABORT: 3/1R

ITEM: MDM FF1, FF2, FF3, FF4

FAILURE MODE: Stuck on a Constant Output to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

# BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- 3) Flight critical Forward MDM (FF1..4)
- 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:	3/2R	AOA:	3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING	•			

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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 3/1R FLIGHT: SUBSYSTEM: DPS

ABORT: 3/1R MDAC ID: 108

MDM FF1, FF2, FF3, FF4 ITEM:

FAILURE MODE: Falsely Stuck on Busy Mode

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- Flight critical Forward MDM (FF1..4)
- 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:	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 1,2,3,2

PART NUMBER: MC615-0004-6110,5110

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, 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.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE: FLIGHT: 3/1R 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:

1) DPS

2) Multiplexer-DeMultiplexers (MDM)

3) Flight critical Aft MDM (FA1..4)

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:	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, 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 121 ABORT: 3/1R

ITEM: MDM FA1, FA2, FA3, FA4
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) Flight critical Aft MDM (FA1..4)
- 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:	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, 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 aft RCS, Body Flap, Ailerons, Rudder, Speedbrake, and ability to purge SSMEs and tanks.

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 (FA1..4)
- 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:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	•		•

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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 123 ABORT: 3/1R

ITEM: MDM FA1, FA2, FA3, FA4
FAILURE MODE: Erroneous Output to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

# BREAKDOWN HIERARCHY:

- 1) DPS
  2) Multiplexer-DeMultiplexers (MDM) | Market | Market | MDM | Market | MDM | Market | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM | MDM
- 3) Flight critical Aft MDM (FA1..4)
- 4) 5)
- 6)
- 7)
- 9)

#### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/2R	RTLS:	3/1R	
LIFTOFF:	3/1R	TAL:	3/1R	
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, 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 aft RCS, Body Flap, Ailerons, Rudder, Speedbrake, and ability to purge SSMEs and tanks.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 124 ABORT: 3/1R

ITEM: MDM FA1, FA2, FA3, FA4

FAILURE MODE: Premature Operation to GPC

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

### BREAKDOWN HIERARCHY:

1) DPS

2) Multiplexer-DeMultiplexers (MDM)

3) Flight critical Aft MDM (FA1..4)

4)

5)

6)

7)

8) 9)

#### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
•	RTLS:	3/1R
•	TAL:	3/1R
3/2R	AOA:	3/1R
3/1R	ATO:	3/1R
3/1R	· <del>-</del> ·	· ·
	3/1R	3/2R RTLS: 3/1R TAL: 3/2R AOA: 3/1R ATO:

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:

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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 125 ABORT: 3/1R

ITEM:

MDM FA1, FA2, FA3, FA4

FAILURE MODE: Premature Operation to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- 3) Flight critical Aft MDM (FA1..4)
- 4)
- 5)
- 6) 7)
- 7)
- 9j

## CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/2R	RTLS:	3/1R
3/1R	TAL:	3/1R
3/2R	AOA:	3/1R
3/1R	ATO:	3/1R
3/1R	er i de la companya d	en en en en en en en en en en en en en e
	3/2R 3/1R 3/2R 3/1R	3/2R RTLS: 3/1R TAL: 3/2R AOA: 3/1R ATO:

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 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 3/1R FLIGHT: DPS SUBSYSTEM: 3/1R ABORT:

126 MDAC ID:

ITEM: MDM FA1, FA2, FA3, FA4

FAILURE MODE: Selected All Channels Wrong

SUBSYS LEAD: B. Robb LEAD ANALYST: W. A. Haufler

# BREAKDOWN HIERARCHY:

1) DPS

2) Multiplexer-DeMultiplexers (MDM)

Flight critical Aft MDM 3)

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:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

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

LOCATION: Av Bay 4,5,6,6

PART NUMBER: MC615-0004-6110,5110

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 use of aft RCS, Body Flap, Ailerons, Rudder, Speedbrake, and ability to purge SSMEs and tanks.

DATE:

HIGHEST CRITICALITY HDW/FUNC 10/03/86

SUBSYSTEM: 3/1R FLIGHT: DPS ABORT: 3/1R 127 MDAC ID:

MDM FA1, FA2, FA3, FA4 ITEM:

FAILURE MODE: Stuck on a Constant Output to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

### BREAKDOWN HIERARCHY:

1) DPS

2) Multiplexer-DeMultiplexers (MDM)

(FA1..4) 3) Flight critical Aft MDM

4)

5)

6)

7) 8)

9)

#### CRITICALITIES

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FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/2R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
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, 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

If all redundancy fails, lose use of aft RCS, Body Flap, 1997 Ailerons, Rudder, Speedbrake, and ability to purge SSMEs and tanks.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 128 ABORT: 3/1R

ITEM: MDM FA1, FA2, FA3, FA4

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) Flight critical Aft MDM (FA1..4)

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:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING			•

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, 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, 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 140 ABORT: 3/3

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

# BREAKDOWN HIERARCHY:

8) 9)

1) DPS
2) Multiplexer-DeMultiplexers (MDM)
3) Payload Forward MDM (PF1..2)
4)
5)
6)
7)

CRITICALITIES

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

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

LOCATION: Av Bay 1,2

PART NUMBER: MC615-0004-6710,5710

CAUSES: Vibration, Corrosion, Contamination

## EFFECTS/RATIONALE:

FCOS/BSS sets Commfault flag for that data. Application SW ignores that data. System software bypasses MDM after 2nd consecutive commfault, and displays fault msg on CRTs. Port moding may not recover MDM.

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.

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 (PF1..2)

4)

5)

6)

7)

8) 9)

#### · CRITICALITIES

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

REDUNDANCY SCREENS: A [ 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 142 ABORT: 3/3

ITEM: MDM PF1,PF2
FAILURE MODE: Erroneous Output to GPC

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

1) DPS
2) Multiplexer-DeMultiplexers (MDM)
3) Payload Forward MDM (PF1..2)
4)
5)
6)

7) 8) 9)

### CRITICALITIES

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

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

LOCATION: AV Bay 1,2

PART NUMBER: MC615-0004-6710,5710

CAUSES: Vibration, Corrosion, Contamination

## EFFECTS/RATIONALE:

FCOS/BSS sets Commfault flag for that data. Application SW ignores that data. System software bypasses MDM after 2nd consecutive commfault, and displays fault msg on CRTs. Port moding may not recover MDM.

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.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE: 3/1R FLIGHT: SUBSYSTEM: DPS 3/3 ABORT: MDAC ID: 143

ITEM:

MDM PF1, PF2

FAILURE MODE: Erroneous Output to LRU

SUBSYS LEAD: B. Robb LEAD ANALYST: W. A. Haufler

## BREAKDOWN HIERARCHY:

1) DPS

2) Multiplexer-DeMultiplexers (MDM)

3) Payload Forward MDM (PF1..2)

4)

5)

6)

7)

8) 9)

### CRITICALITIES

41/4 2 4 411-4			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/2R	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING	: 3/3		

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

· 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.

HDW/FUNC HIGHEST CRITICALITY 10/03/86 DATE: FLIGHT: 3/1R

5 - 12 - - -

SUBSYSTEM: DPS ABORT: 3/3 MDAC ID: 144

MDM PF1.PF2 ITEM:

FAILURE MODE: Premature Operation to GPC

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- Payload Forward MDM (PF1..2)
- 4)
- 5)
- 6)
- 7) 8)
- 9)

## CRITICALITIES

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

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

LOCATION: Av Bay 1,2

PART NUMBER: MC615-0004-6710,5710

CAUSES: Vibration, Corrosion, Contamination

## EFFECTS/RATIONALE:

This failure on either port can interfere with FCOS/BSS returning data from other PF MDM and cause good MDM to be bypassed. Port moding will not fix a blabbing MDM. Power cycling may reset electronics, but will not always stop premature operations. 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 145 ABORT: 3/3

ITEM: MDM PF1, PF2

FAILURE MODE: Premature Operation to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

9)

1) DPS
2) Multiplexer-DeMultiplexers (MDM)
3) Payload Forward MDM (PF1..2)
4)
5)
6)
7)
8)

CRITICALITIES

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

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 146 ABORT: 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 (PF1..2)

4) 5)

6)

7)

8) 9)

CRITICALITIES

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

REDUNDANCY SCREENS: A [ 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 arm without an EVA.

#### REFERENCES:

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 147 ABORT: 3/3

ITEM: MDM PF1, PF2

FAILURE MODE: Stuck on a Constant Output to LRU

LEAD ANALYST: W. A. Haufler SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- 3) Payload Forward MDM (PF1..2)
- 4)
- 5)
- 6)
- 7)
- 8) 9)

#### CRITICALITIES

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

REDUNDANCY SCREENS: A [ 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 3/1R SUBSYSTEM: DPS FLIGHT: 3/3 ABORT:

148 MDAC ID:

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 (MDM)
- 3) Payload Forward MDM (PF1..2)

4)

ITEM:

5)

6)

7) 8)

9)

#### CRITICALITIES

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

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

LOCATION: Av Bay 1,2

PART NUMBER: MC615-0004-6710,5710

CAUSES: Vibration, Corrosion, Contamination, SCU Busy Crossstrap stuck high

## EFFECTS/RATIONALE:

FCOS/BSS sets Commfault flag for that data. Application SW ignores that data. System software bypasses MDM after 2nd consecutive commfault, and displays fault msg on CRTs. Port moding may not recover MDM.

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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 180 ABORT: /NA

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	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING	: 3/2R		•

REDUNDANCY SCREENS: A [ 1 ] B [NA ] 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 systems while attached.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 181 ABORT: /NA

ITEM: MDM LF1, LA1

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) 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 [NA ] ' C [ P ]

LOCATION: Av Bay 1,6

PART NUMBER: MC615-0004-6610,5600

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 ability of GSE to monitor and control systems while attached.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 182 ABORT: /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	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 [NA ] 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, but not allowed during ascent until after 2nd MDM failure. If all redundancy fails, lose ability of GSE to monitor and control systems while attached.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 183 ABORT: /NA

ITEM: MDM LF1, LA1
FAILURE MODE: Erroneous Output to LRU

SUBSYS LEAD: B. Robb

BREAKDOWN HIERARCHY:

DPS
 Multiplexer-DeMultiplexers (MDM)
 preLaunch Forward & Aft MDM (LF, LA)

LEAD ANALYST: W. A. Haufler

4) 5) 6) 7)

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 [NA ] C [ P ]

LOCATION: Av Bay 1,6

PART NUMBER: MC615-0004-6610,5600 1994 2000 2000

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 ability of GSE to monitor and control systems while attached.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R

MDAC ID: 184 ABORT: /NA

ITEM: MDM LF1, LA1

FAILURE MODE: Premature Operation 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)
- 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/SAFIN	G: 3/2R		

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

LOCATION: Av Bay 1,6

PART NUMBER: MC615-0004-6610,5600

CAUSES: Vibration, 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 will not always stop premature operations. If all redundancy fails, lose ability of GSE to monitor and control systems while attached.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 185 ABORT: /NA

ITEM: MDM LF1, LA1

FAILURE MODE: Premature Operation to LRU

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		, i

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

LOCATION: AV Bay 1,6

PART NUMBER: MC615-0004-6610,5600

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 ability of GSE to monitor and control systems while attached.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 186 ABORT: /NA

ITEM: MDM LF1, LA1

FAILURE MODE: Selected All Channels Wrong

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 [NA ] C [ P ]

LOCATION: AV Bay 1,6

PART NUMBER: MC615-0004-6610,5600

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 of GSE to monitor and control systems while attached.

HDW/FUNC HIGHEST CRITICALITY 10/03/86 DATE: 3/2R FLIGHT: SUBSYSTEM: DPS /NA ABORT: 187 MDAC ID: ITEM: MDM LF1, LA1 FAILURE MODE: Stuck on a Constant Output to LRU SUBSYS LEAD: B. Robb LEAD ANALYST: W. A. Haufler 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 [NA ] C [ P ]

LOCATION: Av Bay 1,6

PART NUMBER: MC615-0004-6610,5600

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 ability of GSE to monitor and control systems while attached.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE:

3/2R FLIGHT: SUBSYSTEM: DPS /NA ABORT: MDAC ID: 188

MDM LF1, LA1 ITEM:

FAILURE MODE: Falsely Stuck on Busy Mode

SUBSYS LEAD: B. Robb LEAD ANALYST: W. A. Haufler

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) Multiplexer-DeMultiplexers (MDM)
- 3) preLaunch Forward & Aft MDM (LF, LA)
- 4)
- 5)
- 6)
- 7) 8)
- 9)

### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/2R	RTLS:	/NA
/NA	TAL:	/NA
/NA	AOA:	/NA
/NA	ATO:	/NA
3/2R	_	
	3/2R /NA /NA /NA	3/2R RTLS: /NA TAL: /NA AOA: /NA ATO:

REDUNDANCY SCREENS: A [ 1 ] B [NA ] 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/22/86 SUBSYSTEM: DPS FLIGHT: 3/1R 3/1R ABORT: MDAC ID: 190

ITEM: RESISTOR, CURRENT LIMITING

FAILURE MODE: OPEN

LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIPLEXER-DEMULTIPLEXERS (MDM)
- 3) POWER DISTRIBUTION
- 4) RESISTOR, CURRENT LIMITING

5)

6)

7) 8)

### CRITICALITIES

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

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

LOCATION:

PART NUMBER: RWR80S1211FR

CAUSES: THERMAL STRESS, VIBRATION, SHOCK, FRACTURE

### EFFECTS/RATIONALE:

NO EFFECT ON ONE FAILURE SINCE MDM ARE NOT INTERRUPTED WITH LOSS OF ONE-OF-TWO POWER CIRCUITS. NO EFFECT ON FAILURES OF BOTH RESISTORS (NO LOSS OF VECHICLE) SINCE MDM ARE ALSO REDUNDANT.

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 191 ABORT: 3/1R

ITEM: CONTROLLER, REMOTE POWER

FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, OPEN OR SHORT TO

GROUND

LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIPLEXER-DEMULTIPLEXERS (MDM)
- 3) POWER DISTRIBUTION
- 4) CONTROLLER, REMOTE POWER
- 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:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

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

LOCATION:

PART NUMBER: MC450-0017-2050, 2075

CAUSES: PIECE PART STRUCTURE FAILURE, VIBRATION, THERMAL STRESS

EFFECTS/RATIONALE:

NO EFFECT ON ONE FAILURE SINCE MDM ARE NOT INTERRUPTED WITH LOSS OF ONE-OF-TWO POWER CIRCUITS. NO EFFECT ON FAILURE (NO LOSS OF VEHICLE) OF BOTH RESISTORS SINCE MDM ARE ALSO REDUNDANT.

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 192 ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER

FAILURE MODE: INADVERTENT OPERATION: CONDUCTS PREMATURELY

LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIPLEXER-DEMULTIPLEXERS (MDM)
- 3) POWER DISTRIBUTION
- 4) CONTROLLER, REMOTE POWER

5)

6)

7) 8)

9)

#### CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: CONTAMINATION, SHOCK, PIECE PART FAILURE

### EFFECTS/RATIONALE:

NO EFFECT ON ANY MDMs THAT ARE OPERATIONAL THROUGHOUT THE ENTIRE MISSION (FF1,3 AND FA1,2). POWER WILL BE APPLIED TO ANY ONE OF THE FOLLOWING MDMs: FF2,4 AND FA3,4 IF ITS DEDICATED SWITCH FAILS AND IF THE APPROPRIATE POWER BUSSES ARE "ON".

HIGHEST CRITICALITY HDW/FUNC 10/22/86 DATE:

FLIGHT: 3/1R SUBSYSTEM: DPS 3/1R ABORT: 193 MDAC ID:

SWITCH, MDM POWER ITEM:

FAILURE MODE: FAILS OPEN

LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIPLEXER-DEMULTIPLEXERS (MDM)
- 3) FA, FF2, FF4, AND PF MDMs
- POWER DISTRIBUTION 4)
- SWITCH, MDM POWER 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:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R	•	

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

LOCATION:

PART NUMBER: ME452-0102-7201

CAUSES: PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL

SHOCK, VIBRATION

### EFFECTS/RATIONALE:

NO EFFECT ON ONE FAILURE SINCE MDM ARE NOT INTERRUPTED WITH LOSS OF ONE-OF-TWO POWER CIRCUITS. NO EFFECT ON FAILURES OF BOTH RESISTORS (NO LOSS OF VEHICLE) SINCE MDMs ARE ALSO REDUNDANT.

HIGHEST CRITICALITY HDW/FUNC 10/22/86 DATE:

3/3 FLIGHT: SUBSYSTEM: DPS ABORT: 3/3 MDAC ID: 194

SWITCH, MDM POWER ITEM:

FAILURE MODE: PREMATURE OPERATION: CLOSES INADVERTENTLY

LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIPLEXER-DEMULTIPLEXERS (MDM)
- 3) FA, FF2, FF4, AND PF MDMs
- POWER DISTRIBUTION 4)
- 5) SWITCH, MDM POWER

6)

7)

8) 9)

#### CRITICALITIES

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

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

LOCATION:

PART NUMBER: ME452-0102-7201

CAUSES: PIECE-PART STRUCTURAL FAILURE, SHOCK, VIBRATION, THERMAL

STRESS

#### EFFECTS/RATIONALE:

NO EFFECT ON MDMs THAT ARE OPERATIONAL THROUGHOUT THE ENTIRE MISSION. THIS SWITCH FAILURE WILL INADVERTENTLY POWER UP MDMs THAT MIGHT BE OFF; I.E. FA3, FA4, FF2, AND FF4. NO LOSS OF VEHICLE.

DATE: 10/22/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 195 ABORT: 3/1R

ITEM: SWITCH, MDM POWER

FAILURE MODE: FAILS OPEN

LEAD ANALYST: W. A. HAUFLER SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIPLEXER-DEMULTIPLEXERS (MDM)
- 3) FF1, AND FF3 MDMs
- 4) POWER DISTRIBUTION
- 5) SWITCH, MDM POWER
- 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:	3/2R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	3/1R	, A. A. A. A. A. A. A. A. A. A. A. A. A.	•

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

LOCATION: ·

PART NUMBER: ME452-0102-7210

CAUSES: STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, VIBRATION

### EFFECTS/RATIONALE:

NO EFFECT ON ONE FAILURE SINCE MDM ARE NOT INTERRUPTED WITH LOSS OF ONE-OF-TWO POWER CIRCUITS. TWO FAILURE (LOSS OF BOTH POWER CIRCUITS AND THUS BOTH FF1 AND FF3) WOULD CAUSE LOSS OF ONE NSP INTERFACE.

WORKAROUND EXISTS TO UPDATE STATE VECTOR WITH LOSS OF BOTH FF1 AND FF3.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 201 ABORT: 3/1R

ITEM: Input/Output Processor (IOP)

FAILURE MODE: Loss of 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)
- 2)
- 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:	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 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 in loss of a GPC's ability to communicate over that bus, attached bus terminal units (BTU's), and all inputs and outputs connected to those BTU's. In dynamic flight phases, where a single BTU controls an actuator, the crew would have to manually intervene on a single failure, and switching transients could arise. Loss of all redundancy would cause loss of vehicle control.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 202 ABORT: 3/1R

ITEM: Input/Output Processor (IOP)
FAILURE MODE: Erratic/Erroneous 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)

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

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 vehicel/life.

HIGHEST CRITICALITY HDW/FUNC 10/22/86 DATE:

FLIGHT: 3/1R SUBSYSTEM: DPS ABORT: 3/1R MDAC ID: 203

Input/Output Processor (IOP) ITEM:

FAILURE MODE: Premature Operation

LEAD ANALYST: T. B. Cribbs SUBSYS LEAD: B. Robb

#### BREAKDOWN HIERARCHY:

- 1) DPS
- General Purpose Computer (GPC) 2)
- Input/Output Processor (IOP) 3)

4)

5)

6)

7) 8)

9)

### CRITICALITIES

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

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

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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 204 ABORT: 3/1R

ITEM: Input/Output Processor (IOP)

FAILURE MODE: Erroneous Input

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)

CRITICALITIES

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

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, 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R

MDAC ID: 205 ABORT: 3/1R

ITEM: Central Processing Unit (CPU)

FAILURE MODE: Loss of output

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)

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
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 Bays

PART NUMBER:

CAUSES: CPU fails to function due to loss of power or failure of memory timing page

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#### 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 206 ABORT: 3/1R

ITEM: Central Processing Unit (CPU)

FAILURE MODE: Erroneous/erratic output

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)

#### CRITICALITIES

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

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 instable switchover transients.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 207 ABORT: 3/1R

ITEM: Central Processing Unit (CPU)

FAILURE MODE: Delayed/premature/inadvertent operation

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)

### CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/2R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	: 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 synch up by waiting for synch 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-synch 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 2/1R MDAC ID: 208 ABORT: 2/1R

ITEM: Central Processing Unit (CPU)

FAILURE MODE: Inadvertent operation

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)

#### CRITICALITIES

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

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 busstringing 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 commands: loss of vehicle/life.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3
MDAC ID: 209 ABORT: 3/3

ITEM: CPU Power Switch FAILURE MODE: Fails closed

LEAD ANALYST: T. B. Cribbs SUBSYS LEAD: B. Robb

### BREAKDOWN HIERARCHY:

1) DPS

2) General Purpose Computer (GPC)

3) Central Processing Unit (CPU)

4) CPU Power Switch

5)

6) 7)

s)

9)

#### CRITICALITIES

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

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

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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

FLIGHT: 3/1R SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 210

GPC Mode Switch ITEM: FAILURE MODE: Fails closed

SUBSYS LEAD: B. Robb LEAD ANALYST: T. B. Cribbs

#### BREAKDOWN HIERARCHY:

- 1) DPS
- General Purpose Computer (GPC) Central Processing Unit (CPU) 2)
- 3)
- GPC Mode Switch 4)

5)

6)

7)

8) 9)

CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/1R
3/1R	TAL:	3/1R
	AOA:	3/1R
3/1R	ATO:	3/1R
: 3/1R		
	3/3 3/1R 3/2R 3/1R	3/3 RTLS: 3/1R TAL: 3/2R AOA: 3/1R ATO:

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

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 211 ABORT: 3/1R

ITEM: GPC Output Switch

FAILURE MODE: Fails closed

LEAD ANALYST: T. B. Cribbs SUBSYS LEAD: B. Robb

#### BREAKDOWN HIERARCHY:

1) DPS

2) General Purpose Computer (GPC)

3) Central Processing Unit (CPU)

4) GPC Output Switch

5)

6) 7)

8)

9)

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	3/3	RTLS:	3/1R	
LIFTOFF:	3/1R	TAL:	3/1R	
ONORBIT:	3/3	AOA:	3/1R	
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 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 213 ABORT: 3/1R

ITEM:

GPC Power 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)
- 4) GPC Power Switch
- 5)
- 6)
- 7)
- 8) 9)

## CRITICALITIES

FLIGHT PHASE '	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/2R	AOA:	3/1R
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 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.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3
MDAC ID: 214 ABORT: /NA

ITEM: DRIVER MODULE CONTROLLER

FAILURE MODE: PREMATURE OUTPUT

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) POWER DISTRIBUTION
- 4) DRIVER MODULE CONTROLLER

5)

6)

7)

9)

## CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: INTERNAL COMPONENT FAILURE

EFFECTS/RATIONALE:

PREMATURE OPERATION CAUSES POWER TO BE APPLIED TO A GPC. NO HARMFUL EFFECTS TO POWER UP A GPC.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 215 ABORT: 3/1R

ITEM: DRIVER MODULE CONTROLLER

FAILURE MODE: NO OUTPUT

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) POWER DISTRIBUTION
- 4) DRIVER MODULE CONTROLLER
- 5)
- 6)
- 7)
- 8)

### CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: INTERNAL COMPONENT

EFFECTS/RATIONALE:

LOSS ONE OF THREE REDUNDANT POWER SOURSES TO A GPC.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 216 ABORT: 3/3

ITEM: SWITCH, GPC POWER FAILURE MODE: PREMATURE CLOSURE

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) POWER DISTRIBUTION
- 4) SWITCH, GPC POWER

5)

6)

7)

8) 9)

## CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: VIBRATION, PIECE PART FAILURE

EFFECTS/RATIONALE:

THE MAIN DC POWER IS APPLIED TO THE GPC. NO HARMFUL EFFECTS TO APPLY POWER TO A GPC.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 2/1R MDAC ID: 217 ABORT: 2/1R

ITEM: SWITCH, GPC POWER

FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) POWER DISTRIBUTION
- 4) SWITCH, GPC POWER
- 5)
- 6)
- 7)
- 8) 9)

#### CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: VIBRATION, PIECE PART FAILURE

## EFFECTS/RATIONALE:

POSSIBLE MISSION TERMINATION ON FIRST FAILURE. SECOND FAILURE COULD CAUSE LOSS OF CREW AND VEHICLE. IF FAILURE OCCURS CLOSE TO MECO THERE IS NOT ENOUGH TIME TO MANUALLY SHUT DOWN ENGINES TO PREVENT CAVITATION.

HIGHEST CRITICALITY HDW/FUNC 10/20/86 DATE:

FLIGHT: 3/3 SUBSYSTEM: DPS

ABORT: 3/3 MDAC ID: 218

STATUS LIGHT ITEM: FAILURE MODE: NO OUTPUT

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) GENERAL PROCESSING UNIT (CPU)
- 4) STATUS LIGHT
- 5)
- 6)
- 7) 8)
- 9)

CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: FILAMENT FAILURE, VIBRATION

EFFECTS/RATIONALE:

NO EFFECT. CRT DISPLAYS GPC STATUS, BARBER POLE INDICATES OUTPUT OF FAILED GPC IS TERMINATED.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/20/86 FLIGHT: 3/3 ABORT: 3/3 SUBSYSTEM: DPS

3/3

ABORT: MDAC ID: 219

ITEM: CICU

FAILURE MODE: NO OUTPUT

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) GENERAL PROCESSING UNIT (CPU)
- 4) COMPUTER INTERFACE CONDITIONING UNIT (CICU)

5)

6)

7)

8) 9)

CRITICALITIES

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

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

LOCATION: PART NUMBER:

CAUSES: INTERNAL COMPONENT FAILURE, VIBRATION

EFFECTS/RATIONALE:

NO EFFECT. LOSS OF CONVERSION POWER TO DRIVE GPC STATUS LIGHTS HAS SAME EFFECT AS LOSS OF STATUS LIGHT. OTHER INDICATORS PROVIDE GPC HEALTH STATUS.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 220 ABORT: 3/2R

ITEM: S

SWITCH, IPL

FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) SWITCH, IPL
- 4)
- 5)
- 6) 7)
- 8)
- 9)

## CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: VIBRATION, PIECE PAST FAILURE

EFFECTS/RATIONALE:

NO EFFECT IF GPC IS IN RUN OR STANDBY MODE. IPL NOT NECESSARY IN-FLIGHT UNLESS ANOTHER FAILURE OCCURS TO GPC FIRST.

HIGHEST CRITICALITY HDW/FUNC 10/20/86 DATE:

3/3 FLIGHT: SUBSYSTEM: DPS 3/3 ABORT: MDAC ID: 221

INDICATOR, IPL ITEM:

FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- GENERAL PURPOSE COMPUTER (GPC) 2)
- 3) INDICATOR, IPL
- 4)
- 5)
- 6)
- 7) 8)
- 9)

### CRITICALITIES

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

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

LOCATION: PART NUMBER:

CAUSES: VIBRATION, SHOCK

EFFECTS/RATIONALE:

A FALSE INDICATOR OF THE IPL FUNCTION HAS NO EFFECT ON THE GPC. IPL FUNCTION CAN BE MONITORED ON COMPUTER ANNUNICATOR PANEL FOR GPC STATUS.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3
MDAC ID: 222 ABORT: 3/3

ITEM: INDICATOR, IPL

FAILURE MODE: FAILS TO TRANSFER INDICATION OF GPC MODE

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

1) DPS

2) GENERAL PURPOSE COMPUTER (GPC)

3) INDICATOR, IPL

4)

5)

6) 7)

8) 9)

CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: VIBRATION, SHOCK

EFFECTS/RATIONALE:

AN ERRONEOUS INDICATION OF THE GPC STATUS WILL BE DISPLAYED. NO EFFECT ON THE GPC'S FUNCTIONS.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 223 ABORT: 3/3

ITEM: INDICATOR OUTPUT, BARBER POLE

FAILURE MODE: ERRONEOUS INDICATION

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) INDICATOR OUTPUT
- 4)
- 5)
- 6)
- 7)
- 8) 9)

### CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: FAILED DRIVER, SHOCK, VIBRATION

EFFECTS/RATIONALE:

INDICATES ERRONEOUS GPC STATUS. NO EFFECT OF GPC FUNCTION. GPC

STATUS DISPLAYED ON GPC STATUS ANNUNCIATOR.

HIGHEST CRITICALITY HDW/FUNC 10/20/86 DATE:

3/3 FLIGHT: SUBSYSTEM: DPS ABORT: 3/3 MDAC ID: 224

INDICATOR OUTPUT, BARBER POLE ITEM:

FAILURE MODE: FAILS TO TRANSFER

SUBSYS LEAD: B. ROBB LEAD ANALYST: B. ROBB

### BREAKDOWN HIERARCHY:

1) DPS

- GENERAL PURPOSE COMPUTER (GPC) 2)
- 3) INDICATOR OUTPUT

4)

5)

6)

7) 8)

9)

#### CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: VIBRATION, SHOCK, PIECE PART FAILURE

EFFECTS/RATIONALE:

ERRONEOUS INDICATION OF GPC STATUS. GPC STATUS ANNUNCIATOR CAN BE MONITORED OF GPC STATUS.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/24/86

FLIGHT: 2/1R SUBSYSTEM: DPS ABORT: 2/1R MDAC ID: 225

INPUT/OUTPUT PROCESSOR (IOP) ITEM:

FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER
- INPUT/OUTPUT PROCESSOR (IOP)
- 4)
- 5)
- 6)
- 7) 8)
- 9)

#### CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: INTERNAL COMPONENT FAILURE

EFFECTS/RATIONALE:

MAY EXECUTE COMMAND TO WRONG MDM WITH ADDRESS ERROR. THE WORST CASE WOULD BE TO AN UNVOTED EFFECTOR. NO EFFECT ON 1ST FAILURE. CREW CAN PRECLUDE SENSITIVITY TO 2ND FAILURE.

DATE:

10/30/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS

FLIGHT:

/NA

MDAC ID:

226

ABORT:

/NA

ITEM:

RESISTOR

FAILURE MODE: NOT APPLICABLE

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

BREAKDOWN HIERARCHY:

- 1) DPS
- GPC 2)
- RESISTOR 3)
- 4)
- 5)
- 6)
- 7)
- 8) 9)

CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: RESISTOR HAS BEEN REPLACED WITH A FUSE.

EFFECTS/RATIONALE:

THIS RESISTOR HAS BEEN REPLACED WITH PART NUMBER ME451-0018-0300 (SEE FMEA #05-6S-BFUS1-1)

REFERENCES: FMEA NO. 05-6S-BRES1-1 NASA-JSC FMEA CIL REVIEW COMMENTS.

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 227 ABORT: 3/1R

ITEM: FUSE FAILURE MODE: OPEN

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

BREAKDOWN HIERARCHY:

1) DPS

2) GPC

3) FUSE

4)

5)

6)

7)

8) 9)

CRITICALITIES

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

LANDING/SAFING: 3/1R

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

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL FRACTURE

EFFECTS/RATIONALE:

REFERENCES: FMEA NO. 05-6S-BFUS1-1

DATE:

10/30/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS

FLIGHT:

3/1R

MDAC ID:

228

ABORT:

3/1R

ITEM:

CONTROLLER, REMOTE POWER

FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

BREAKDOWN HIERARCHY:

- 1) DPS
- GPC 2)
- 3) CONTROLLER, REMOTE POWER

4)

5)

6)

7)

8) 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
TANDING /CAPING.	3/10		

LANDING/SAFING: 3/1R

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

LOCATION:

PART NUMBER:

CAUSES: TEMPERATURE STRESS, MECHANICAL FRACTURES, CONTAMINATION,

DEBRIS

EFFECTS/RATIONALE:

ONE OF THREE REDUNDANT RPC IS DISABLED.

REFERENCES: FMEA NO. 05-6S-BRPC-1. NASA JSC FMEA CIL REVIEW COMMENTS.

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 229 ABORT: 3/3

ITEM: CONTROLLER, REMOTE POWER

FAILURE MODE: CONDUCTS PREMATURELY

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GPC
- 3) CONTROLLER, REMOTE POWER

4)

- ·5)
- 6)
- 7) 38,)
- **9**)

#### CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/3	RTLS:	3/3
3/3	TAL:	3/3
3/3	AOA:	3/3
3/3	ATO:	3/3
: 3/3	•	
	3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:

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

LOCATION:

PART NUMBER:

CAUSES: TEMPERATURE STRESS, MECHANICAL FRACTURE, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

MONE. POWER WOULD BE APPLIED PREMATURELY.

REFERENCES: FMEA NO. 05-6S-BRPC1-2. NASA-JSC FMEA CIL REVIEW COMMENTS.

DATE: 11/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 230 ABORT: 3/1R

ITEM: DIODE

FAILURE MODE: FAILS OPEN

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GPC
- 3) DIODE
- 4)
- 5)
- 6)
- 7) 8)
- 9)

CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: THERMAL STRESS, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

NONE ON FIRST/SECOND FAILURE. THREE RPC OUTPUTS ARE "OR" TOGETHER TO PROVIDE TRIPLY REDUNDANT POWER PATH TO CPU AND IOP. THREE FAILURES COULD CAUSE LOSS OF GPC.

REFERENCES: 05-6S-BDIOX-1. NASA-JSC FMEA & CIL REVIEW COMMENTS.

DATE: 11/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 231 ABORT: 3/1R

ITEM: SWITCH, NORMAL-TERM BACK-UP

FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GPC
- 3) SWITCH, NORMAL-TERM BACKUP
- 4)
- 5)
- 6)
- 7)
- 9)

#### CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: THERMAL STRESS, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

WILL TERMINATE FC DATA BUS I/O ACTIVITY OF A GOOD GPC.

REFERENCES: FMEA 05-5-B15-1-1

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 232 ABORT: 3/1R

ITEM: SWITCH, GPC POWER

FAILURE MODE: NO OUTPUT

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) GENERAL PURPOSE COMPUTER (GPC)
- 3) POWER DISTRIBUTION
- 4) DRIVER MODULE CONTROLLER

5)

6)

7) 8)

9)

CRITICALITIES

			11-12-5 D
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/1R	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

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

LOCATION:

PART NUMBER:

CAUSES: INTERNAL COMPONENT

EFFECTS/RATIONALE:

LOSS ONE OF THREE REDUNDANT POWER SOURSES TO A GPC.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 300 ABORT: 3/1R

ITEM: KEYBOARD SWITCH FAILURE MODE: OPEN/CLOSED

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) KEYBOARD
- 4) SWITCH
- 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:	3/1R	AOA:	3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING	•	•	•	

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

LOCATION:

UPPER CREW AREA

PART NUMBER:

CAUSES: MECHANICAL FRACTURE/ 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

FLIGHT: 3/1R SUBSYSTEM: DPS ABORT: 3/1R MDAC ID: 301

ITEM: X/Y DEFLECTION AMPLIFIERS

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DISPLAY UNIT
- X/Y DEFLECTION AMPLIFIERS

5)

6) 7)

8)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
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: UPPER CREW AREA

PART NUMBER:

CAUSES: TEMPERATURE STRESS/ 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 302 ABORT: 3/1R

ITEM: VIDEO AMPLIFIER

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DISPLAY UNIT
- 4) VIDEO AMPLIFIER
- 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:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	: 3/1R	•	

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

LOCATION: UPPER CREW AREA

PART NUMBER:

CAUSES: TEMPERATURE STRESS/ 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

FLIGHT: 3/1R SUBSYSTEM: DPS ABORT: 3/1R MDAC ID: 303

ITEM: CATHODE-RAY TUBE

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DISPLAY UNIT
- CATHODE-RAY TUBE 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:	3/1R	AOA:	3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING:	3/1R	-	• •	

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

LOCATION: UPPER CREW AREA

PART NUMBER:

CAUSES: SHOCK/ TEMPERATURE STRESS/ MECHANICAL FRACTURE/ VIBRATION/ 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 304 ABORT: 3/1R

ITEM: HI AND LOW VOLTAGE POWER SUPPLIES FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DISPLAY UNIT
- 4) HIGH AND LOW (+/-5, 15, 28 & 80 VDC) VOLTAGE POWER SUPPLIES
- 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:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	•		

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

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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

FLIGHT: 3/1R SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 305

RPC ITEM:

FAILURE MODE: OPEN/CLOSED/PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DISPLAY UNIT
- 4) RPC
- 5)
- 6)
- 7) 8)

## CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC
3/2R	RTLS:	3/1R
3/1R	TAL:	3/1R
3/1R	AOA:	3/1R
3/1R	ATO:	3/1R
3/1R	<del>-</del>	•
	3/2R 3/1R 3/1R 3/1R	3/2R RTLS: 3/1R TAL: 3/1R AOA: 3/1R ATO:

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

LOCATION: UPPER CREA AREA

PART NUMBER:

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.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE:

3/1R SUBSYSTEM: DPS FLIGHT: 3/1R ABORT: MDAC ID: 306

ITEM: MEMORY

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

SUBSYS LEAD: B. ROBB LEAD ANALYST: H J LOWERY

#### BREAKDOWN HIERARCHY:

- DPS
- MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS) 2)
- 3) DEU
- 4) MEMORY
- 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:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING /SAFING.	•		•

LANDING/SAFING: 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

3/1R FLIGHT: SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 307

KEYBOARD ADAPTER ITEM:

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

1) DPS

MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS) 2)

3) DEU

KEYBOARD ADAPTER 4)

5)

6)

7) 8)

## CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
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: UPPER CREW AREA

PART NUMBER:

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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 308 ABORT: 3/1R

ITEM: SYMBOL GENERATOR

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DEU
- 4) SYMBOL GENERATOR
- 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:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 309 ABORT: 3/1R

ITEM: MIA

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DEU
- 4) MIA
- 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:	3/1R	AOA:	3/1R	
DEORBIT:	3/1R	ATO:	3/1R	
LANDING/SAFING	: 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 310 ABORT: 3/1R

ITEM: CONTROL LOGIC

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DEU
- 4) CONTROL LOGIC
- 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:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	•		•

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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

FLIGHT: 3/1R SUBSYSTEM: DPS ABORT: 3/1R MDAC ID: 311

POWER SUPPLIES ITEM:

FAILURE MODE: NO OUTPUT/ERRONEOUS/ERRATIC OUTPUT

SUBSYS LEAD: B. ROBB LEAD ANALYST: H J LOWERY

## BREAKDOWN HIERARCHY:

1) DPS

- MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS) 2)
- 3) DEU

POWER SUPPLIES (+/-5, 12 & 15 VDC)

5)

7) 8)

## CRITICALITIES

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

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 312 ABORT: 3/1R

ITEM: RPC

FAILURE MODE: OPEN/CLOSED/PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DEU
- 4) RPC
- 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:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/1R		

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

LOCATION:

UPPER CREW AREA

PART NUMBER:

CAUSES: TEMPERATURE STRESS/ 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3
MDAC ID: 313 ABORT: 3/3

ITEM:

LOAD SWITCH

FAILURE MODE: OPEN/CLOSED/PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

BREAKDOWN HIERARCHY:

1) DPS

- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DEU
- 4) LOAD SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

## CRITICALITIES

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

LANDING/SAFING: 3/3

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

LOCATION:

UPPER CREW AREA

PART NUMBER:

CAUSES: MECHANICAL FRACTURE/ CONTAMINATION/ DEBRIS

EFFECTS/RATIONALE:

DEUS ARE NOT NORMALLY RELOADED DURING A MISSION. SWITCH IS NOT

NEEDED.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 314 ABORT: 3/1R

ITEM: FUNCTION SWITCH

FAILURE MODE: OPEN/CLOSED/PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DEU
- 4) FUNCTION SWITCH
- 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:	3/1R	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING	: 3/1R		

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

E-89

LOCATION: UPPER CREW AREA

PART NUMBER:

CAUSES: MECHANICAL FRACTURE/ CONTAMINATION/ DEBRIS

EFFECTS/RATIONALE:

IMPROPER MAJOR FUNCTION IDENTIFICATION

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

3/1R FLIGHT: SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 315

DATA BUS COUPLER (DBC) ITEM:

FAILURE MODE: OPEN/SHORT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS) 2)
- 3) DBC
- 4)
- 5)
- 6)
- 7) 8)
- 9)

## CRITICALITIES

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

LOCATION: ALL AV BAYS

PART NUMBER:

CAUSES: MECHANICAL FRACTURE/ CONTAMINATION/ DEBRIS

## EFFECTS/RATIONALE:

LOSS OF DATA BUS. REDUNDANT HARDWARE WOULD NOT BE ACCESSIBLE DURING PERIODS OF ANTICIPATED HIGH ACCELERATION/DEACCELERATION

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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86 3/2R FLIGHT: SUBSYSTEM: DPS /NA ABORT: MDAC ID: 316 DBIA ITEM: FAILURE MODE: OPEN/SHORT/ERRONEOUS/ERRATIC OUTPUT SUBSYS LEAD: B. ROBB LEAD ANALYST: H J LOWERY BREAKDOWN HIERARCHY: 1) DPS MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS) 2) 3) DBIA 4) 5) 6) 7) 8) 9) CRITICALITIES HDW/FUNC ABORT HDW/FUNC FLIGHT PHASE 3/2R RTLS: 3/2R PRELAUNCH: TAL: /NA LIFTOFF: 3/2R /NA AOA: ONORBIT: /NA DEORBIT: /NA ATO: /NA LANDING/SAFING: /NA REDUNDANCY SCREENS: A [ 1 ] B [NA ] C [ P ] AV BAY 5 LOCATION: PART NUMBER: CAUSES: MECHANICAL FRACTURE/ CONTAMINATION/ DEBRIS

REFERENCES:

EFFECTS/RATIONALE:

LOSS OF ONE COMMAND/DATA PATH

DATE: 10/27/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 317 ABORT: 3/3

ITEM:

RESISTOR

FAILURE MODE: OPEN

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) EPD&C
- 2) DPS&C
- 3) MCDS
- 4) RESISTOR

5)

6)

7)

8) 9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: THERMAL STRESS, CONTAMINATION

## EFFECTS/RATIONALE:

NO EFFECT. POWER TO MCDS IS NEITHER AFFECTED NOR INTERRUPTED. RESISTOR PROVIDES SIGNAL THAT INDICATES THE MCDS (DEU/DU) POWER STATUS "ON" OR "STBY". THE MDM (OF4) WILL INTERPRET NO SIGNAL AS POWER "OFF" CONDITION.

DATE: 10/27/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 318 ABORT: 3/3

ITEM: RPC

FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MCDS
- 3) DU
- 4) RPC
- 5)
- 6)
- 7)
- 8) 9)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: MECHANICAL FRACTURE/CONTAMINATION/DEBRIS

EFFECTS/RATIONALE:

NONE. DU WILL HAVE POWER APPLIED PREMATURELY.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3

MDAC ID: 319 ABORT: 3/3

ITEM: SWITCH, CRT POWER FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

1) DPS

- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DU
- 4) SWITCH, CRT POWER
- 5)
- 6)
- 7)
- 8) 9)

## CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: MECHANICAL FRACTURE, CONTAMINATION

EFFECTS/RATIONALE:

NONE. DU WILL HAVE POWER APPLIED PREMATURELY.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/3

SUBSYSTEM: DPS FLIGHT: 3/3
MDAC ID: 320 ABORT: 3/3

ITEM: RPC

FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MULTIFUNCTIONAL CRT DISPLAY SYSTEM (MCDS)
- 3) DEU
- 4) CONTROLLER

5)

6)

7)

8)

CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: TEMPERATURE STRESS/MECHANICAL

FRACTURE/CONTAMINATION/DEBRIS

EFFECTS/RATIONALE:

NONE. DEU WILL HAVE POWER APPLIED PREMATURELY.

DATE: 11/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 321 ABORT: 3/3

ITEM: DIODE, SUPPRESSOR FAILURE MODE: FAILS SHORTED

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MCDS
- 3) DEU
- 4) DIODE, SUPPRESSOR

5)

6)

7)

8) 9)

CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: THERMAL STRESS, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

LACK OF SUPPRESSION OF DEU TO MDM REVERSE TRANSIENTS WOULD ENABLE PREMATURE "ON" INDICATION OF THE DEU.

REFERENCES: FMEA-05-6S-BDIO1-1. NASA JSC FMEA & CIL REVIEW COMMENTS.

HIGHEST CRITICALITY HDW/FUNC 11/10/86 DATE: SUBSYSTEM: DPS FLIGHT: 3/1R ABORT: 3/1R MDAC ID: 322

ITEM: SWITCH, CRT POWER FAILURE MODE: SHORT TO GROUND

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

#### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MCDS
- 3) DU
- SWITCH, CRT POWER 4)
- 5)
- 6)
- 7)
- 8) 9)

## CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: MECHANICAL SHOCK, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

ACTIVATION OF ASSOCIATED OVERLOAD PROTECTIVE CIRCUITS. LOSS OF

REFERENCES: FMEA 05-6Q-2201-3. NASA-JSC FMEA & CIL REVIEW COMMENTS, 9-11-86.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 400 ABORT: 3/2R

ITEM: Tape transport mechanism

FAILURE MODE: Loss of Output

LEAD ANALYST: K. Pietz SUBSYS LEAD: B. Robb

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MASS MEMORY UNITS (MMU)
- 3) Tape transport mechanism
- 4)
- 5)
- 6)
- 7) 8)
- 9)

#### CRITICALITIES

	V1/2 2 2 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			
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: 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 401 ABORT: 3/2R

ITEM: Tape transport mechanism

FAILURE MODE: Erroneous Output

LEAD ANALYST: K. Pietz SUBSYS LEAD: B. Robb

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MASS MEMORY UNITS (MMU)
- 3) Tape transport mechanism
- 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: Worn tape or foreign matter on tape, 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.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE:

FLIGHT: 3/2R SUBSYSTEM: DPS ABORT: 3/2R MDAC ID: 402

Read electronics ITEM: FAILURE MODE: Loss of Output

SUBSYS LEAD: B. Robb LEAD ANALYST: K. Pietz

### BREAKDOWN HIERARCHY:

- 1) DPS
- MASS MEMORY UNITS (MMU) 2)
  - 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 403 ABORT: 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.

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)
- ø)

## 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/SAFIN	G: /NA		•

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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R

MDAC ID: 405 ABORT: 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 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 [ 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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 406 ABORT: 3/2R

ITEM: Write electronics FAILURE MODE: Loss of Output

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)

### 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 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 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 [ 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

SUBSYSTEM: DPS FLIGHT: 3/2R ABORT: 3/2R MDAC ID: 408

Switch ITEM:

FAILURE MODE: Failed Open

SUBSYS LEAD: B. Robb LEAD ANALYST: K. Pietz

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MASS MEMORY UNITS (MMU)
- Power supply
- 4) Switch
- 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
TANDING/SAFING	. /NA		•

LANDING/SAFING: /NA

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.

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:	' 3/2R	RTLS:	/NA
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	/NA	ATO:	3/3
LANDING/SAFIN	IG: /NA		•

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

LOCATION: AV Bay 1,2
PART NUMBER: MC 615-0005

CAUSES: Stray particle

EFFECTS/RATIONALE:

None

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 410 ABORT: 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

	V-1			
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 or 3 software cannot be loaded. However, OPS 3 can be uplinked or BFS engaged for entry.

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

41/2 2 3 31.22 2 2 2 2				
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/SAFII	NG: /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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 412 ABORT: 3/2R

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

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. Neither of these options require the use of MMUs.

DATE: 10/20/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 413 ABORT: 3/2R

ITEM: RESISTOR, CURRENT LIMITER

FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MASS MEMORY UNIT (MMU)
- 3) POWER DISTRIBUTION
- 4) RESISTOR, CURRENT LIMITER
- 5)
- 6)
- 7)
- 8) 9)

CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: VIBRATION, SHOCK, PIECE PART FAILURE

EFFECTS/RATIONALE:

LOSS CONTROL AND USE OF ONE MMU. LOAD GPC OR MCDS WITH REMAINING GOOD MMU.

DATE: 10/30/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 414 ABORT: 3/2R

ITEM: CONTROLLER, REMOTE POWER

FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MMU
- 3) CONTROLLER, REMOTE POWER
- 4) 5)
- 5) 6)
- 7)
- 8) 9)
  - CRITICALITIES

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

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

# LOCATION:

PART NUMBER:

CAUSES: TEMPREATURE STRESS, MECHANICAL FRACTURE, CONTAMINATION, DEBRIS

## EFFECTS/RATIONALE:

NONE. BFS GPC AND A FROZEN PRIMARY GPC DO NOT REQUIRE IPL OR OVERLAY DURING ORBIT BEFORE ENTRY.

REFERENCES: FMEA NO. 05-6S-BRPC2-1. NASA-JSC FMEA CIL REVIEW COMMENTS.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/3 MDAC ID: 415 ABORT: 3/3

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)

4) MMU Initial Program Load (IPL) Source Switch

5)

6)

7)

8)

9)

CRITI	CAL	ITI.	ES

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

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

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

HIGHEST CRITICALITY HDW/FUNC DATE: 11/10/86

FLIGHT: 3/3 SUBSYSTEM: DPS MDAC ID: 416 ABORT: 3/3

CONTROLLER, REMOTE POWER ITEM:

FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: T. B. Cribbs SUBSYS LEAD: B. Robb

# BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MMU
- 3) CONTROLLER, REMOTE POWER

4)

5)

6)

7) 8)

9)

# CRITICALITIES

HDW/FUNC	ABORT	HDW/FUNC	
3/3	RTLS:	3/3	
3/3	TAL:	3/3	
3/3	AOA:	3/3	
3/3	ATO:	3/3	
: 3/3	•	·	
	3/3 3/3 3/3 3/3	3/3 RTLS: 3/3 TAL: 3/3 AOA: 3/3 ATO:	

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

LOCATION: PART NUMBER:

CAUSES: MECHANICAL SHOCK, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

NO EFFECT. PREMATURE TURN ON.

REFERENCES: 05-6S-BRPC2-1. NASA-JSC FMEA & CIL REVIEW COMMENTS, 9-19-86.

DATE: 11/10/86 HIGHEST CRITICALITY HDW/FUNC SUBSYSTEM: DPS FLIGHT: 3/2R MDAC ID: 417 ABORT: 3/2R

ITEM: SWITCH, IPL

FAILURE MODE: SWITCH SHORT, BOTH IPL OUTPUTS ARE TRUE.

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. Robb

# BREAKDOWN HIERARCHY:

- 1) DPS
- 2) MMU
- 3) SWITCH, IPL
- 4)
- 5)
- 6)
- 7)
- 8) 9)

# CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: MECHANICAL SHOCK, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

LOSS OF GPC IF IN HALT MODE.

REFERENCES: 05-5-B16-1-1. NASA-JSC FMEA & CIL REVIEW COMMENTS, 9-19-86.

DATE:

10/03/86

HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS

FLIGHT:

3/1R

MDAC ID: 501

ABORT:

3/1R

ITEM:

CIA

FAILURE MODE: LOSS OF OUTPUT TO MAIN ENGINE ON ONE CHANNEL

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

1) DPS

ENGINE INTERFACE UNIT (EIU) 2)

CONTROLLER INTERFACE ADAPTER

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: 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.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE:

FLIGHT: 3/1R SUBSYSTEM: DPS ABORT: 3/1R MDAC ID: 502

ITEM: MIA

FAILURE MODE: LOSS OF OUTPUT TO MAIN ENGINE ON ONE CHANNEL

SUBSYS LEAD: B. ROBB LEAD ANALYST: B. ROBB

### BREAKDOWN HIERARCHY:

- 1) DPS
- 2) ENGINE INTERFACE UNIT (EIU)
- MULTIPLEXER INTERFACE ADAPTER 3)
- 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 ]

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.

DATE: 10/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 503 ABORT: 3/1R

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:

- 1) DPS
- 2) ENGINE INTERFACE UNIT (EIU)
- 3) POWER CONTROL SWITCH
- 4)
- 5)
- 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.

HIGHEST CRITICALITY HDW/FUNC DATE: 10/03/86

3/1R FLIGHT: SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 504

INTERNAL POWER SUPPLIES ITEM:

FAILURE MODE: LOSS OF OUTPUT TO MAIN ENGINE ON ANY OF THREE

COMMAND CHANNELS

SUBSYS LEAD: B. ROBB LEAD ANALYST: B. ROBB

# BREAKDOWN HIERARCHY:

- 1) DPS
- ENGINE INTERFACE UNIT (EIU) 2)
- INTERNAL POWER SUPPLIES 3)
- 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			

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

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 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 3/1R MDAC ID: 505 ABORT: 3/1R

ITEM: CONTROLLER INTERFACE ADAPTER

FAILURE MODE: LOSS OF OUTPUT TO ONE OR THREE GPC ON STATUS OF

ENGINES.

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

# BREAKDOWN HIERARCHY:

- 1) DPS
- 2) ENGINE INTERFACE UNIT (EIU)
- 3) CONTROLLER INTERFACE ADAPTER

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: 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.

HIGHEST CRITICALITY HDW/FUNC 10/03/86 DATE:

3/3 FLIGHT: SUBSYSTEM: DPS 3/1R ABORT: MDAC ID: 506

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:

- ENGINE INTERFACE UNIT (EIU) 2)
- OPERATIONAL INTERFACE ELEMENT 3)
- 4)
- 5)
- 6)
- 7)
- 8) 9)

## CRITICALITIES

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

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

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.

HIGHEST CRITICALITY HDW/FUNC 10/20/86 DATE:

2/1R SUBSYSTEM: DPS FLIGHT: ABORT: 2/1R MDAC ID: 507

CIRCUIT, EIU POWER ITEM:

FAILURE MODE: ALL CREDIBLE MODES, OPEN, SHORTS

LEAD ANALYST: B. ROBB SUBSYS LEAD: B. ROBB

# BREAKDOWN HIERARCHY:

- 1) DPS
- ENGINE INTERFACE UNIT (EIU)
- 3) POWER DISTRIBUTION
- 4) CIRCUIT, EIU POWER
- 5)
- 6)
- 7)
- 8) 9)

#### CRITICALITIES

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

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

LOCATION:

PART NUMBER:

CAUSES: PIECE PART FAILURE, SHOCK, VIBRATION

## EFFECTS/RATIONALE:

THE LOSS OF ONE OF TWO REDUNDANT CIRCUITS WILL NOT EFFECT THE EIU. THE LOSS OF BOTH CIRCUITS WILL CAUSE LOSS OF EIU TO MAIN ENGINE INTERFACE. MAIN ENGINE WOULD HAVE TO BE MANUALLY SHUT DOWN AT MECO.

DATE: 11/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 1/1 MDAC ID: 508 ABORT: 1/1

ITEM: EIU

FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

## BREAKDOWN HIERARCHY:

- 1) DPS
- 2) EIU
- 3)
- 4)
- 5)
- 6)
- 7) 8)
- 9)

#### CRITICALITIES

	42/4 4 4 41		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	1/1	RTLS:	1/1
LIFTOFF:	1/1	TAL:	1/1
ONORBIT:	/NA	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING	: /NA		•

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

LOCATION:

PART NUMBER:

CAUSES: THERMAL STRESS, CONTAMINATION, DEBRIS .

EFFECTS/RATIONALE:

ERRONEOUS OUTPUT MAY CAUSE THE GPC'S TO THINK THAT THE ENGINE HAS SHUT DOWN OR THE ENGINE TO CHANGE ITS THROOTLE SETTING, EITHER OF WHICH COULD BE CATASTROPHIC.

REFERENCES: NASA-JSC FMEA & CIL REVIEW COMMENTS.

DATE: 11/03/86 HIGHEST CRITICALITY HDW/FUNC

SUBSYSTEM: DPS FLIGHT: 1/1
MDAC ID: 509 ABORT: 1/1

ITEM: SWITCH, POWER

FAILURE MODE: SHORT BOTH CONTACTS TO GROUND

LEAD ANALYST: H J LOWERY SUBSYS LEAD: B. ROBB

# BREAKDOWN HIERARCHY:

- 1) DPS
- 2) EIU
- 3) SWITCH, POWER
- 4)
- 5)
- 6)
- 7) 8)
- 9)

## CRITICALITIES

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

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

LOCATION:
PART NUMBER:

CAUSES: THERMAL STRESS, CONTAMINATION, DEBRIS

EFFECTS/RATIONALE:

LOSS OF SWITCH CAUSES LOSS OF THAT EIU. LOSS OF EIU CAUSES LOSS OF COMMAND CAPABILITY TO THAT MAIN ENGINE. RESULTS COULD BE CATASTROPHIC.

REFERENCES: NASA-JSC FMEA & CIL REVIEW COMMENTS.

# APPENDIX F

# NASA FMEA TO IOA WORKSHEET CROSS REFERENCE/RECOMMENDATION

This section provides a cross reference between the NASA FMEA and corresponding IOA analysis worksheet(s) included in Appendix E. The Appendix F identifies: NASA FMEA Number, IOA Assessment Number, NASA criticality and redundancy screen data, and IOA recommendations.

# Appendix F Legend

# Code Definition

- 1 IOA recommends changing the second failure mode described in the effects field.
- 2 IOA recommends deleting the IOA failure mode.

APPENDIX F
NASA FMEA TO 10A WORKSHEET CROSS REFERENCE / RECOMMENDATIONS

IDENTIFIE	RS	N	ASA	,	IDA RE	COMMENDATIONS #	
NASA FMEA NO:	I DA ASSESSMENT	CRIT HW/F	SCREEN A B C	CRIT HW/F	SCREEN A B C	OTHER (SEE LEGEND CODE)	ISSUE
05-5 -B01-1-1	DPS-205	2 /1R	PPP	,======		1	X
05-5 -B01-1-2	DPS-206	3 /1R	PPP			4	X
05-5 -B02-1-1	DP5-201	2 /1R	PPP			1	^
05-5 -B02-1-2	DPS-202 DPS-204	3 /1R					}
05-5 -B02-1-3	DPS-225	2 /1R	PPP				
05-5 -B03-1-1	DPS-120	2 /1R	PPP	3 /1R	ррр	1	Х
•	DP5-121		•	3 /1R	PPP	•	
	DP5-128		•	3 /1R	PPP	•	•
05-5 -B03-1-2	DP5-122	2 /1R	PPP				
	DPS-123	•	•				
•	DPS-126	-	-				
	DPS-127	,	<b>P</b> P P	7 /15	ррр	1	l x
05-5 -B03-2-1	DPS-100	2 /1R	P P P	3 /1R 3 /1R	PPP	н Т	\
	DPS-101 DPS-108		π	3 /1R	РРР	•	"
05-5 -B03-2-2	DP5-108	2 /1R	ppp	7 / 11			
V3-3 -BV3 Z Z	DPS-103		` • '				-
•	DPS-106		•				
•	DP5-107	•	•			. •	
05-5 -B03-4-1	DP5-180	3 /2R	PNP			•	
•	DP5-181	•	•				
	DPS-188	- '					
05-5 -B03-4-2	DP5-182	3 /2R	PNP			_	
-	DPS-183 DPS-186	•					1
 #	DPS-187	. •					
05-5 -B03-5-1	DPS-140	2 /1R	ррр				
"	DPS-141						1
	DPS-148	n.	•			-	1
05-5 -B03-5-2	DPS-142	2 /1R	PPP				
•	DPS-143	•	• •		•	·	
*	DPS-146	_					
	DP5-147	7 ,55					
05-5 -B04-2-1	DPS-400	3 /2R	PPP				
	DPS-401 DPS-402		•				
	DP5-403	•					
	DPS-404	•					
n	DPS-405	,					i
W	DPS-406	•	•	ł			
•	DPS-407	•	•				
•	DPS-410	•	•				
*	DPS-412						-
05-5 -B04-2-2	DPS-411	3 /2R	PPP				
05-5 -808-1-1	DPS-501	2 /1R	PFP	<b>I</b>	I		ļ

<sup>#</sup> IF DIFFERENT FROM NASA

APPENDIX F
NASA FMEA TO IDA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS

IDENTIFIERS		NF	15A	IOA RECOMMENDATIONS \$			
NASA FMEA NO:	IOA ASSESSMENT	CRIT HW/F	SCREEN A B C	CRIT HW/F	SCREEN A B C	OTHER (SEE LEGEND CODE)	ISSUE
"	DPS-502	**************************************	*	;======			
u	DPS-503	п	•				
11	DPS-504	н	•				
"	DPS-505	"	•				
u u	DPS-506	"					
05-5 -B13-1-4	DPS-316	3 /2R	PNP				
05-5 -B14-1-1	DPS-315	2 /1R	PPP				
05-5 -B15-1-1	DPS-231	3 /1R	PPP				
05-5 -B15-1-3	DPS-211	3 /1R 3 /2R	PPP		1		
05-5 -B16-1-1 05-5 -B17-1-1	DPS-220 DPS-210	2 /1R	PPP				
05-5 -B18-1-1	DPS-210 DPS-221	3 /3	PPP		}		
05-5 -B18-1-2	DPS-222	3 /3	ррр				1
05-5 -919-1-1	DP5-223	3 /3	ppp		•	]	İ
05-5 -819-1-2	DPS-224	3 /3	PPP				İ
05-5 -B20-1-1	DPS-415	2 /2	PPP			* ·	İ
05-5 -B21-1-1	DPS-301	3 /1R	PPP				•
	DPS-303	•	•				
05-5 -B21-1-2	DPS-302	3 /1R	PPP			ĺ	
<b>"</b>	· DPS-304	-	•			Ì	
05-5 -B22-1-1	DPS-300	2 /1R	PPP				
05-5 -B23-1-1	DPS-30BA	3 /1R	PPP				
05-5 -B23-1-2	DPS-306	3 /1R	PPP				
	DPS-307						
	DPS-30B						
	DPS-309 DPS-310						,
,	DPS-311	,		]] 			ĺ
05→5 -B23-1-3	DP5-307A	2 · / 1R	PPP			,	
05-5 -B24-1-1	DPS-300B	2 /1R	PPP	i			
05-5 -B24-1-2	DPS-300A	3 /2R	PPP				
05-5 -B25-1-3	DPS-313	3 /1R	PPP				
05-5 -B26-1-1	DPS-314A	3 /1R	PPP				
05-5 -B26-1-2	DPS-314	3 /1R	PPP				
05-5 -B26-1-3	DPS-314B	3 /1R	PPP				
05-5 -B27-1-1	DPS-21B	2 /2	PPP				
05-5 -B27-2-1	DPS-219	3 /3	PPP	1			
05-6S-BCKT1-1	DPS-507	2 /1R	PFP				
05-65-BCKT2-1	DPS-316A DPS-312A	3 /3 3 /1R	PPP				
05-6S-BDID1-1 05-6S-BDID1-2	DP5-312H	2 \2	NNN	l			
05-65-BDIOX-1	DPS-230	3 /1R	PFP				
05-65-BDMC1-1	DPS-215	3 /1R	PPP				
05-65-BDMC1-2	DPS-214	3 /3	PPP				
05-65-BFUS1-1	DP5-227	3 /1R	PPP				
05-65-BFUS2-1	DPS-312C	3 /1R	PPP				į
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APPENDIX F
NASA FMEA TO IDA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS

IDENTIFIERS NASA		ASA	IOA RECOMMENDATIONS *				
NASA FMEA NO:	IOA ASSESSMENT	t	SCREEN A B C	CRIT HW/F	SCREEN A B C	OTHER (SEE LEGEND CODE)	ISSUE
05-6S-BRES1-1 05-6S-BRES3-1 05-6S-BRES3-1 05-6S-BRES4-1 05-6S-BRPC1-1 05-6S-BRPC1-2 05-6S-BRPC3-1 05-6S-BRPC3-1 05-6S-BRPC4-1 05-6S-BRPC5-1 05-6S-BRPC5-1 05-6S-BSW1-1 05-6S-BSW1-1 05-6S-BSW1-1 05-6S-BSW1-1 05-6S-BSW1-1 05-6S-BSW3-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-3 05-6S-BSW4-3 05-6S-BSW4-3 05-6S-BSW4-1 05-6S-BSW4-3 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-BSW4-1 05-6S-B	DPS-226 DPS-413 DPS-317 DPS-317 DPS-228 DPS-229 DPS-229 DPS-318 DPS-312 DPS-312 DPS-312 DPS-312 DPS-312 DPS-312 DPS-312 DPS-312 DPS-312 DPS-408 DPS-409 DPS-409 DPS-195 DPS-194 DPS-195 DPS-194 DPS-195 DPS-124 DPS-104 DPS-125 DPS-124 DPS-125 DPS-124 DPS-125 DPS-124 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125 DPS-125	/NA 3 / 1R 3 / 1 / 3 / 3 / 3 / 3 / 3 / 3 / 3 / 3 /	X			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	

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