INDEPENDENT ORBITER ASSESSMENT

ASSESSMENT OF THE INSTRUMENTATION SUBSYSTEM FMEA/CIL

18 FEBRUARY 1988

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

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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, with changes 1, 2, 3, and 4.

The IOA effort first completed an analysis of the Instrumentation 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. 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 Instrumentation hardware.

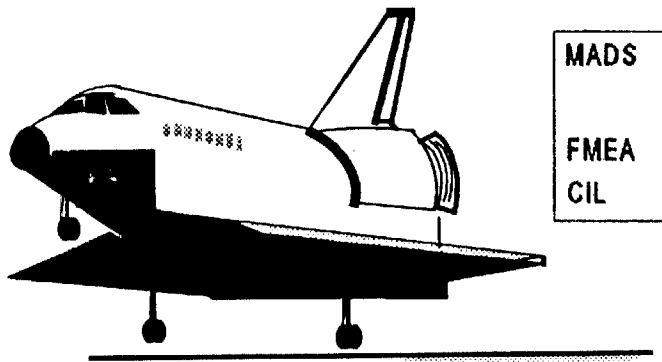
The IOA product for Instrumentation analysis consisted of one hundred-seven failure mode "worksheets" that resulted in twenty-two critical items being identified. Comparison was made to the pre-51L NASA baseline with fourteen Post-51L FMEAs added, which consists of ninety-six FMEAs and eighteen CIL items. The comparison determined if there were any results which had been found by IOA but were not in the NASA baseline. This comparison produced agreement on all but twenty-five FMEAs which caused differences in five CIL items. Reference Figure 1.

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 NASA had used an older ground rules document which has since been superseded by the NSTS 22206 used by the IOA.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.

INSTRUMENTATION FMEA/CIL ASSESSMENT OVERVIEW

INSTRUMENTATION ASSESSMENT SUMMARY							
ORIGINAL ASSESSMENT *				FINAL RESOLUTION**			
	IOA	NASA	ISSUES		IOA	NASA	ISSUES
FMEA	88	82	16	FMEA	107	96	25
CIL	8	3	5	CIL	22	18	5

OI ASSESSMENT SUMMARY			
	IOA	NASA	ISSUES
FMEA	88	78	10
CIL	22	18	4



MADS ASSESSMENT SUMMARY			
	IOA	NASA	ISSUES
FMEA	19	18	1
CIL	0	0	0

* NASA BASELINE PRE 51-L

** FINAL NASA BASELINE AS OF 1 JANUARY 88

Figure 1 - INSTRUMENTATION ASSESSMENT OVERVIEW

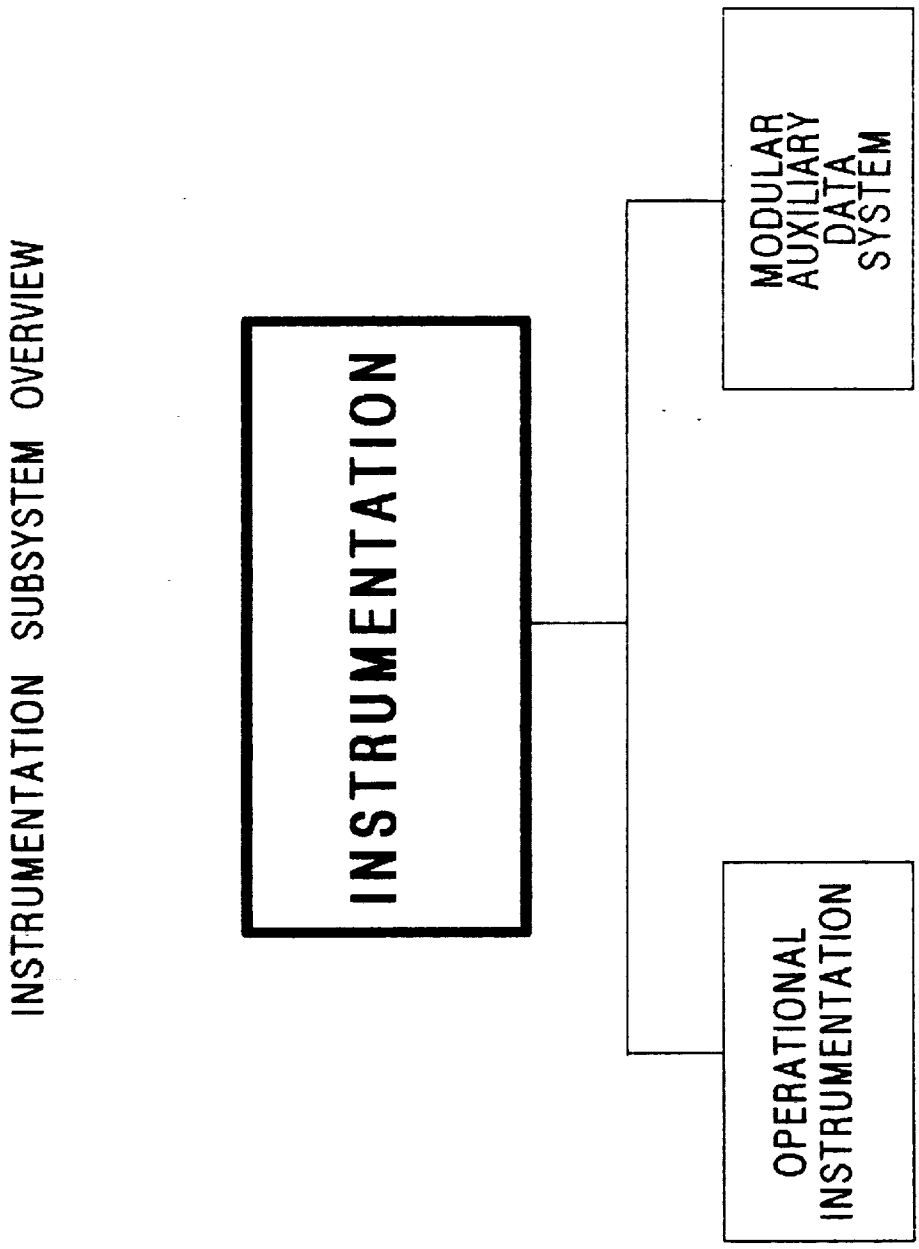


Figure 2a - INSTRUMENTATION SUBSYSTEM OVERVIEW

OPERATIONAL INSTRUMENTATION DETAILED SYSTEM REPRESENTATION OVERVIEW

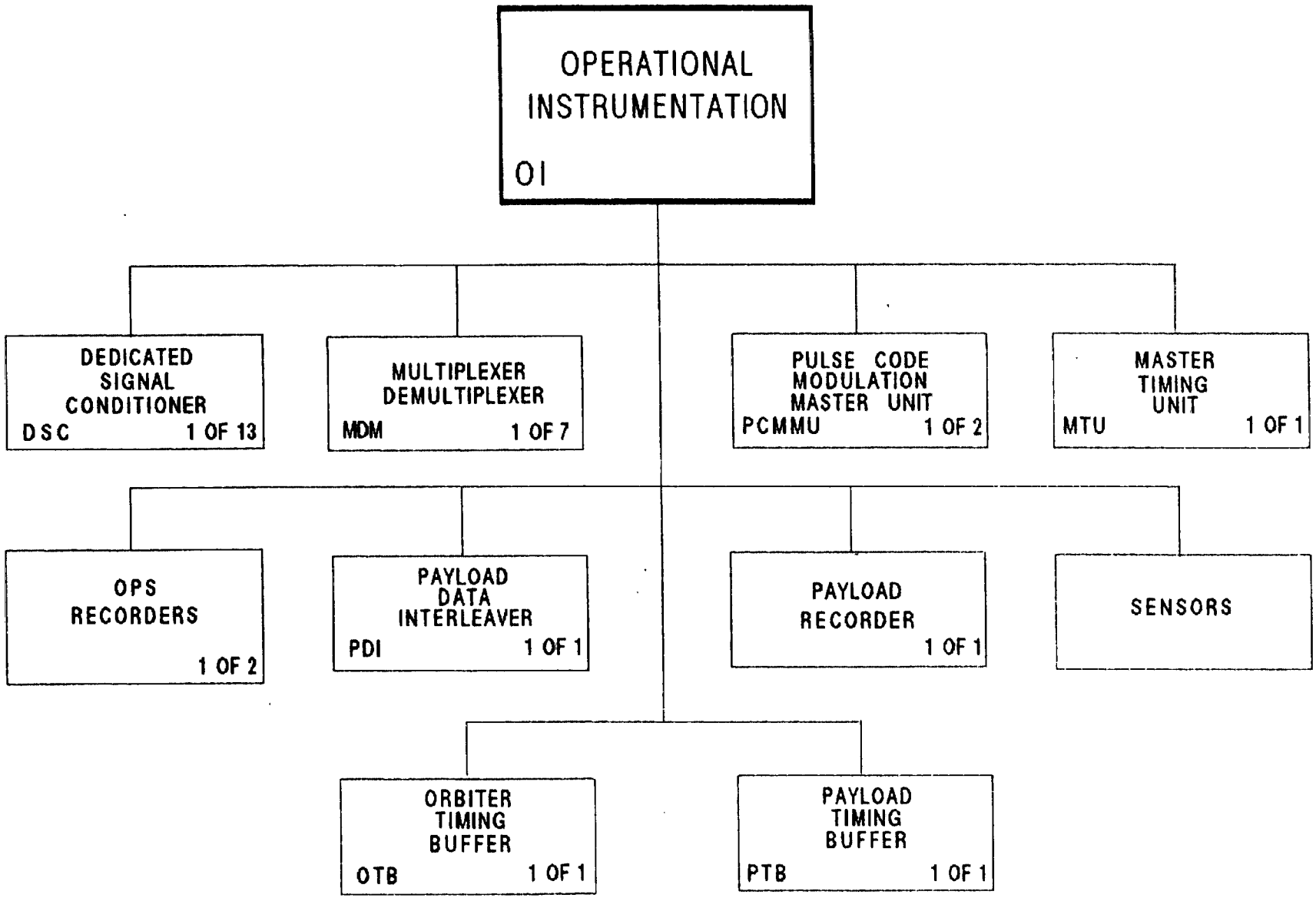
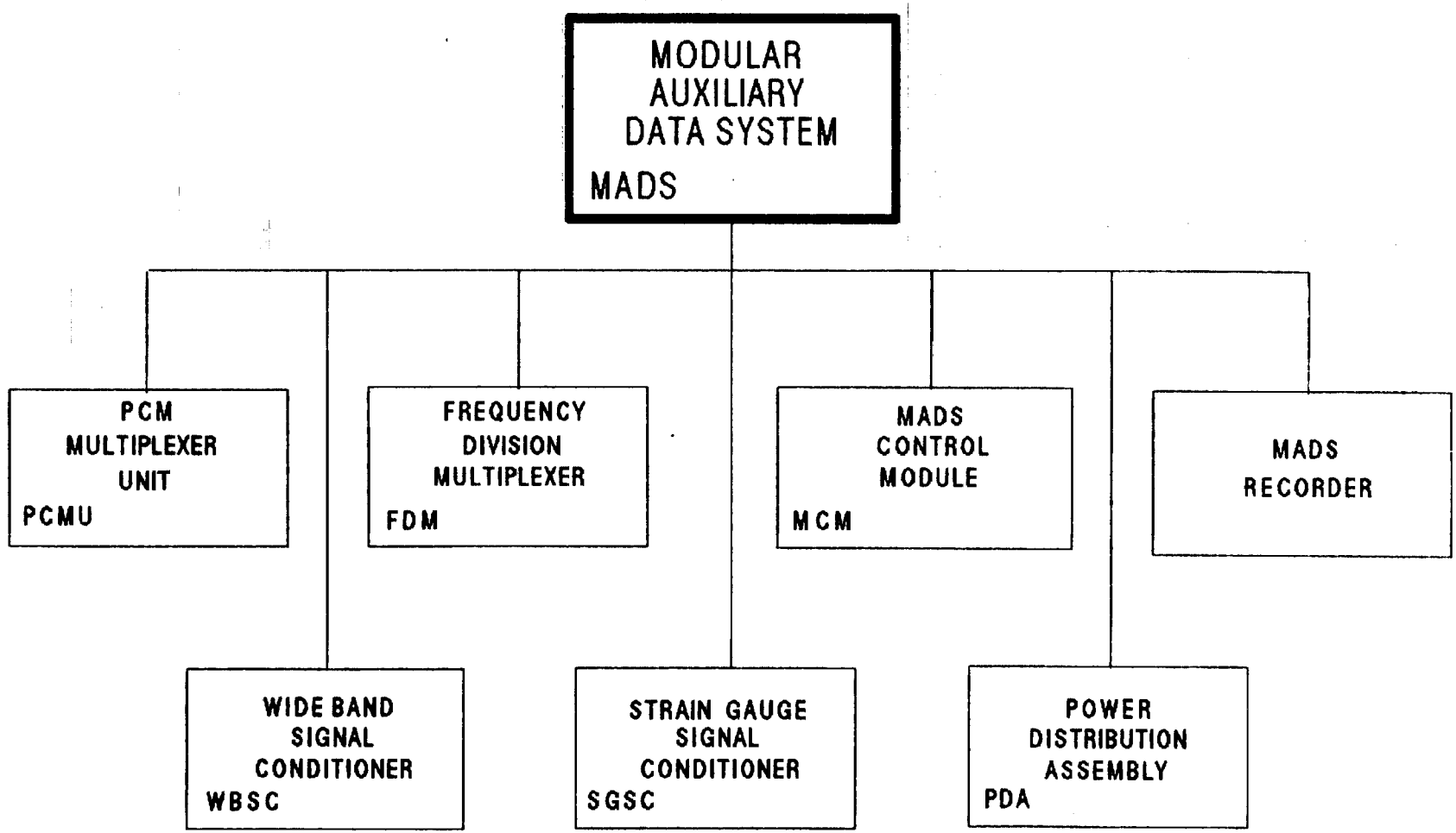


Figure 2b - OPERATIONAL INSTRUMENTATION DETAILED SYSTEM REPRESENTATION OVERVIEW

MADS DETAIL SYSTEM REPRESENTATION OVERVIEW



VEHICLE	PCMU	FDM	MCM	RCDR	WBSC	SGSC	PDA
OV - 102	2	2	1	1	3	2	1
OV - 103/104	1	1	1	1	1	1	1

Figure 2c - MADS DETAIL SYSTEM REPRESENTATION OVERVIEW

2.0 INTRODUCTION

2.1 Purpose

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

2.2 Scope

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

2.3 Analysis Approach

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

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

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

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

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

2.4 Instrumentation Ground Rules and Assumptions

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

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The subsystem consists of the hardware required for data acquisition, conditioning, timing, formatting, and routing for checkout and display as needed, and for recording or downlinking by telemetry as required.

3.1.1 Operational Instrumentation

1. Sensors and transducers acquire data representing measurements or status of individual parameters throughout the vehicle and convert quantities sensed to electrical signals.

2. Signal conditioners normalize or standardize the sensor outputs either to range for analog measurements or to set levels for discretes (ON/OFF, HIGH/LOW). There are 13 Dedicated Signal Conditioners (DCSs) handling approximately 1200 individual measurement channels.

3. Reference junctions provide a reference potential for a known temperature for thermocouple sensors.

4. The seven OI Multiplexer/Demultiplexers (MDMs) format incoming data from signal conditioners and feed it into the OI data buses, which in turn route the formatted data to the active PCMMU.

5. The active Pulse Code Modulation Master Unit accepts incoming data from the OI MDMs, combines that data with GPC downlist data and payload data (if any) from the PDI. The PCMMU formats the data into a serial bit stream and routes it to the communications subsystem for further processing/routing. (A "cold standby" PCMMU is available as a backup.)

6. The Master Timing Unit (MTU) is a very stable and accurate source of timing for Orbiter and payload operations. It provides time in IRIG B GMT and IRIG B MET formats, and also provides synchronizing/timing signals for many Orbiter LRUs.

7. The Orbiter Timing Buffer (OTB) amplifies and splits one IRIG B GMT signal and one IRIG B MET signal to produce eight GMT and four MET outputs for use by the Orbiter.

8. The Payload Timing Buffer (PTB) performs the same functions as the OTB, but for payload users.

9. Two operational tape recorders are used to alternately record and dump OI data and voice. They are identical 14-track wideband units capable of recording analog or digital data and voice.

10. The Payload Recorder (PLR) is identical to the two OPS recorders, and is used to record payload data.

3.1.2 Modular Auxiliary Data System

1. Sensors and transducers perform the same function for MADS as for OI.

2. Strain Gage Signal Conditioners (SGSCs) accept the outputs of completion bridges and condition the signals for handover to the MADS PCM MUX.

3. The PCMU accepts the outputs from the SGSCs and multiplexes, encodes, and formats the data for output to the T-0 umbilical or to the MADS Control Module (MCM) for further routing to the MADS recorder.

4. Wideband Signal Conditioners (WBSCs) handle high-frequency signals and with wide variations in output amplitude, such as from transducers sensing vibratory, acoustic, and POGO phenomena.

5. The Frequency Division Multiplexer (FDM) accepts WBSC outputs. Each individual channel measurement signal modulates a voltage-controlled oscillator (VCO) subcarrier signal. The individual modulated VCO subcarriers are summed and the composite FDM output is passed to the MADS Control Module (MCM) for eventual routing to the MADS recorder.

6. The MCM controls power to the various MADS LRUs and selects recorder speeds, modes, tape direction, tape tracks, and PCM Mux formats and data rates.

3.2 Interfaces and Locations

The Instrumentation hardware is located through the Orbiter. The precise location for each component is shown in Table A.

3.3 Hierarchy

Figures 2a, 2b, and 2c, illustrate the hierarchy of the instrumentation subsystem. Figures 3 - 10 are detailed system diagrams for specific references.

OI

OI NOMENCLATURE		INSTALLED LOCATION	OI NOMENCLATURE		INSTALLED LOCATION
DSCs	OF1	AV BAY 1	PDI		AV BAY 1
	OF2	AV BAY 2	PCMMUs	1	AV BAY 1
	OF3	AV BAY 3		2	AV BAY 2
	OF4	FWD RCS MODULE	MTU		AV BAY 3B
	OA1	AV BAY 4	RCDRs	OPS 1	AV BAY 2
	OA2	AV BAY 5		OPS 2	AV BAY 2
	OA3	AV BAY 6		P/L	AV BAY 1
	OM1	MID FUSELAGE	OTB		BEHIND PANEL L16
	OM2	MID FUSELAGE	PTB		BEHIND PANEL L16
	OL1	LEFT OMS POD			
	OL2	LEFT OMS POD			
	OR1	RIGHT OMS POD			
	OR2	RIGHT OMS POD			
MDMs	OF1	AV BAY 1			
	OF2	AV BAY 2			
	OF3	AV BAY 3			
	OF4	FLT DECK			
	OA1	AV BAY 4			
	OA2	AV BAY 5			
	OA3	AV BAY 6			

MADS

MADS NOMENCLATURE	INSTALLED LOCATION
WBSC	MID BODY
SGSC	MID BODY
PCMU	MID BODY
FDM	MID BODY
PDA	MID BODY
MCM	CABIN MIDDECK
RCDR	CABIN MIDDECK

TABLE A - INSTRUMENTATION EQUIPMENT LOCATION

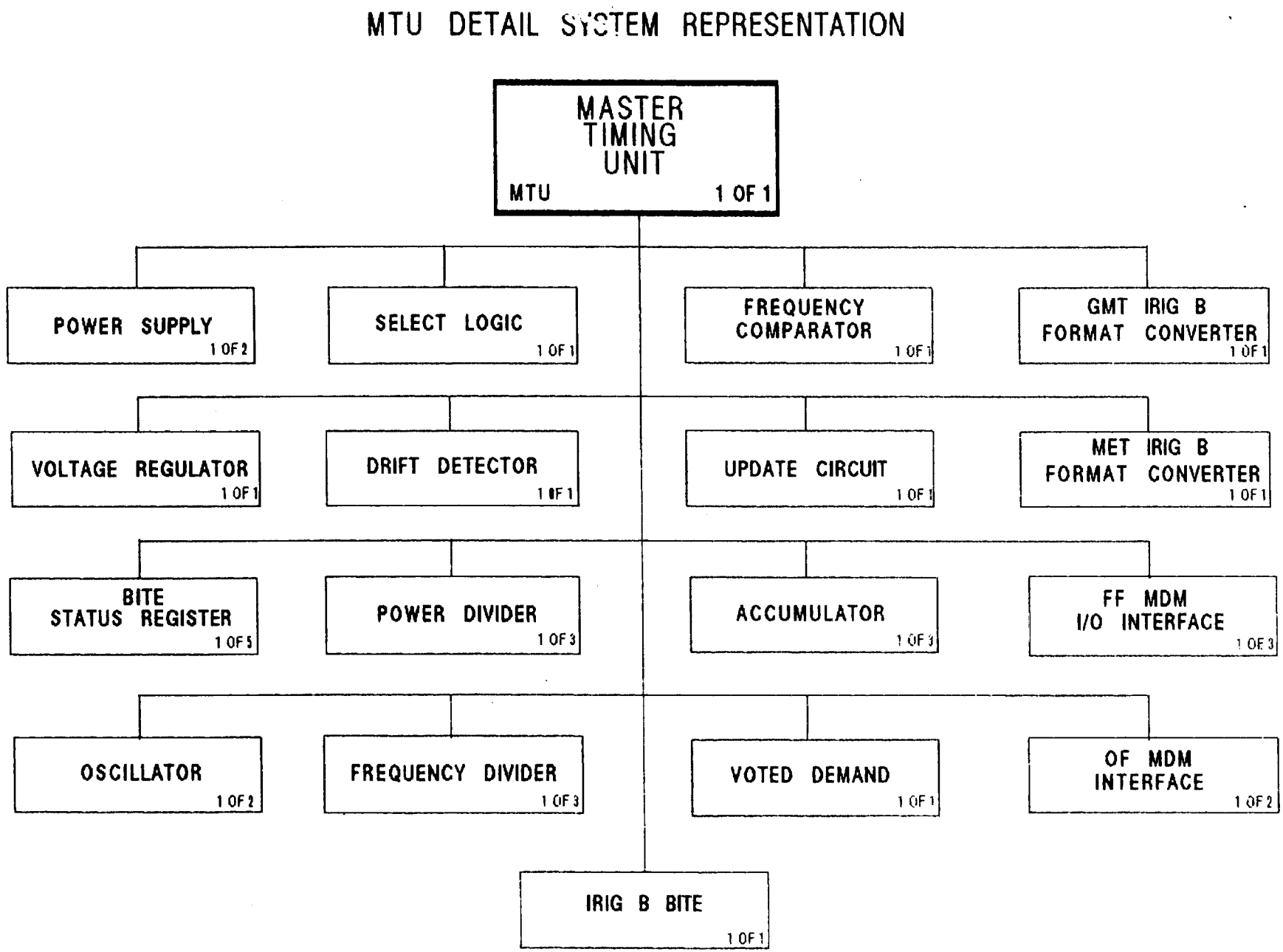


Figure 3 - MASTER TIMING UNIT DETAIL SYSTEM REPRESENTATION

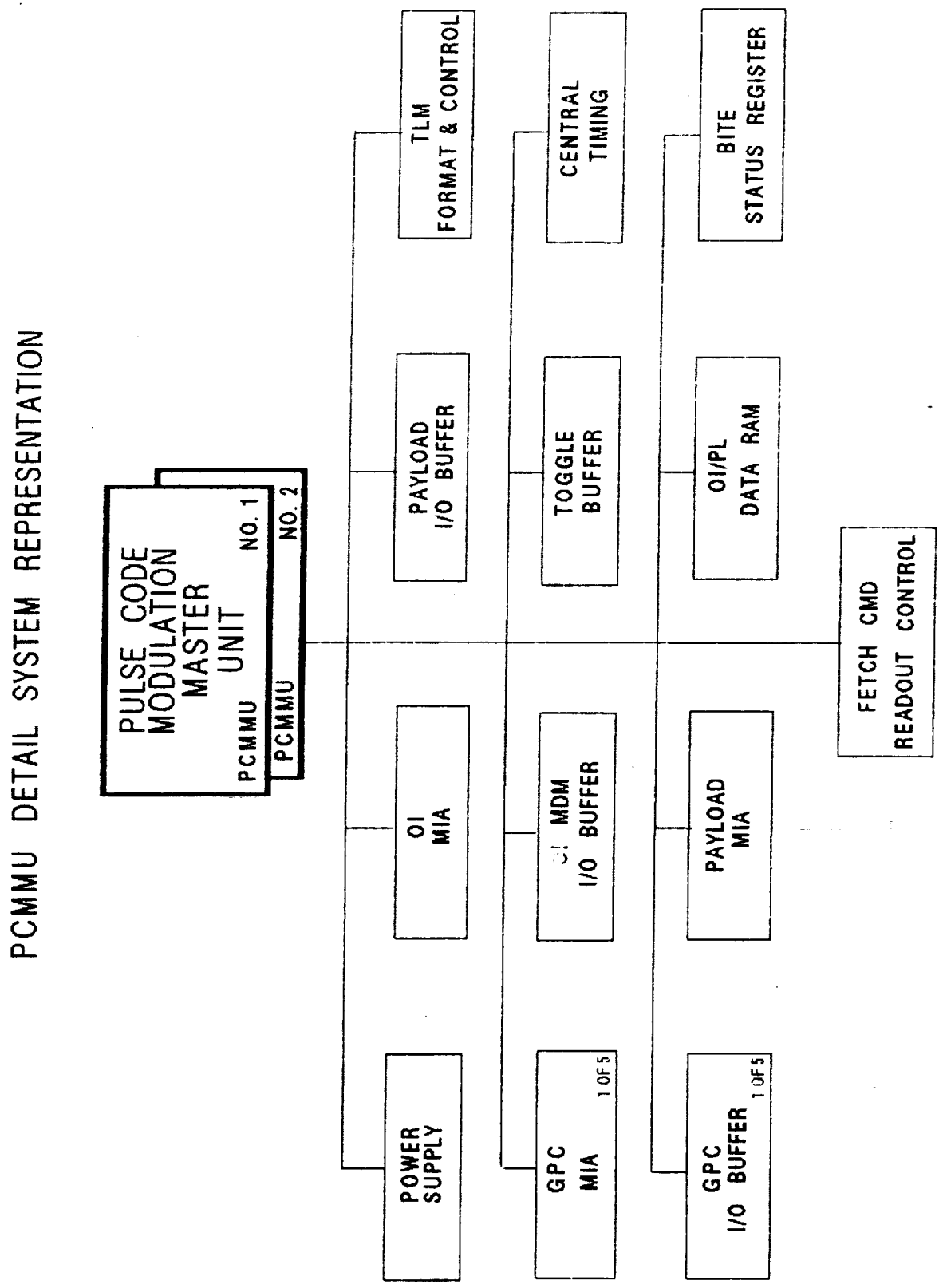


Figure 4 - PCMMU DETAILED REPRESENTATION

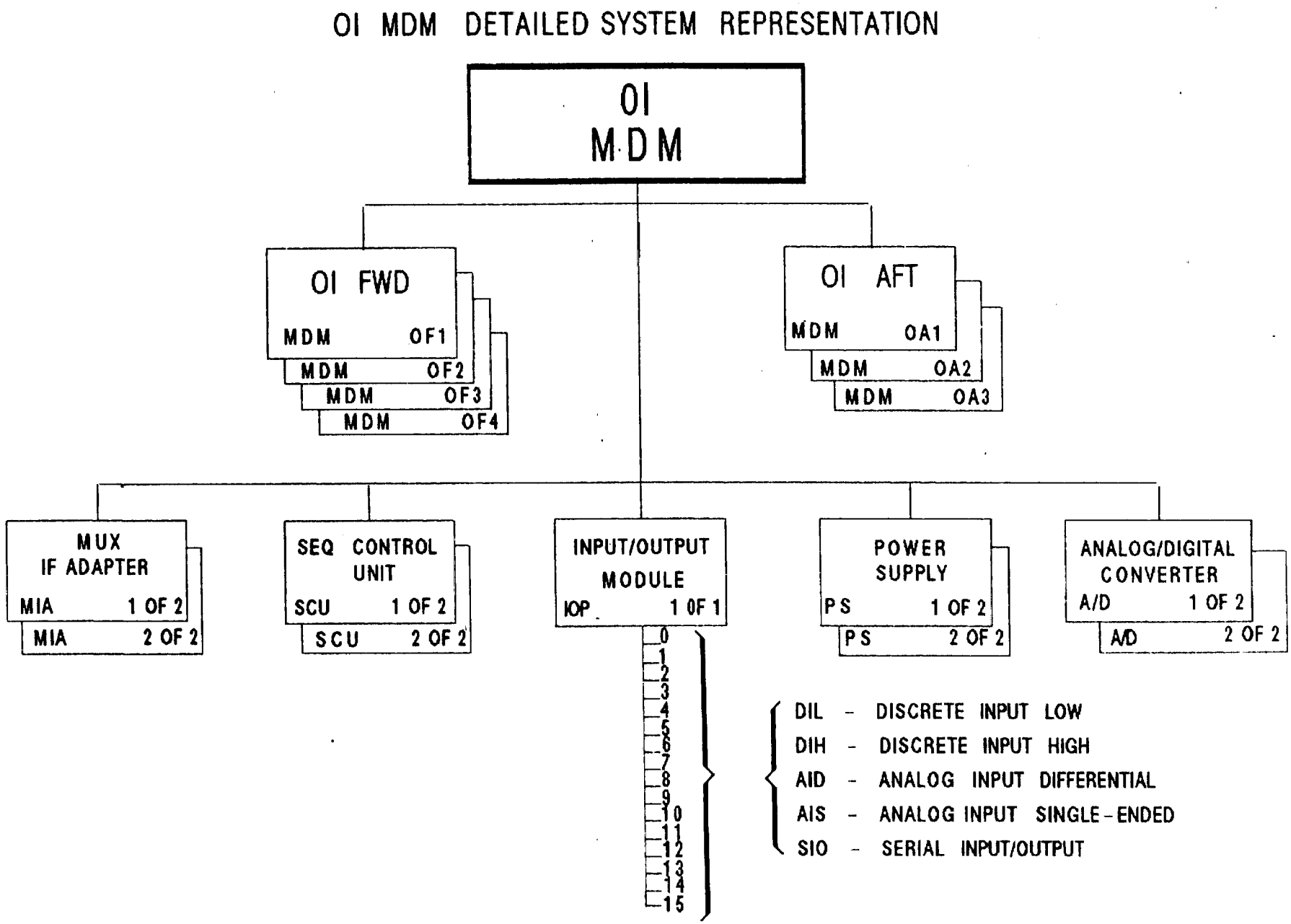
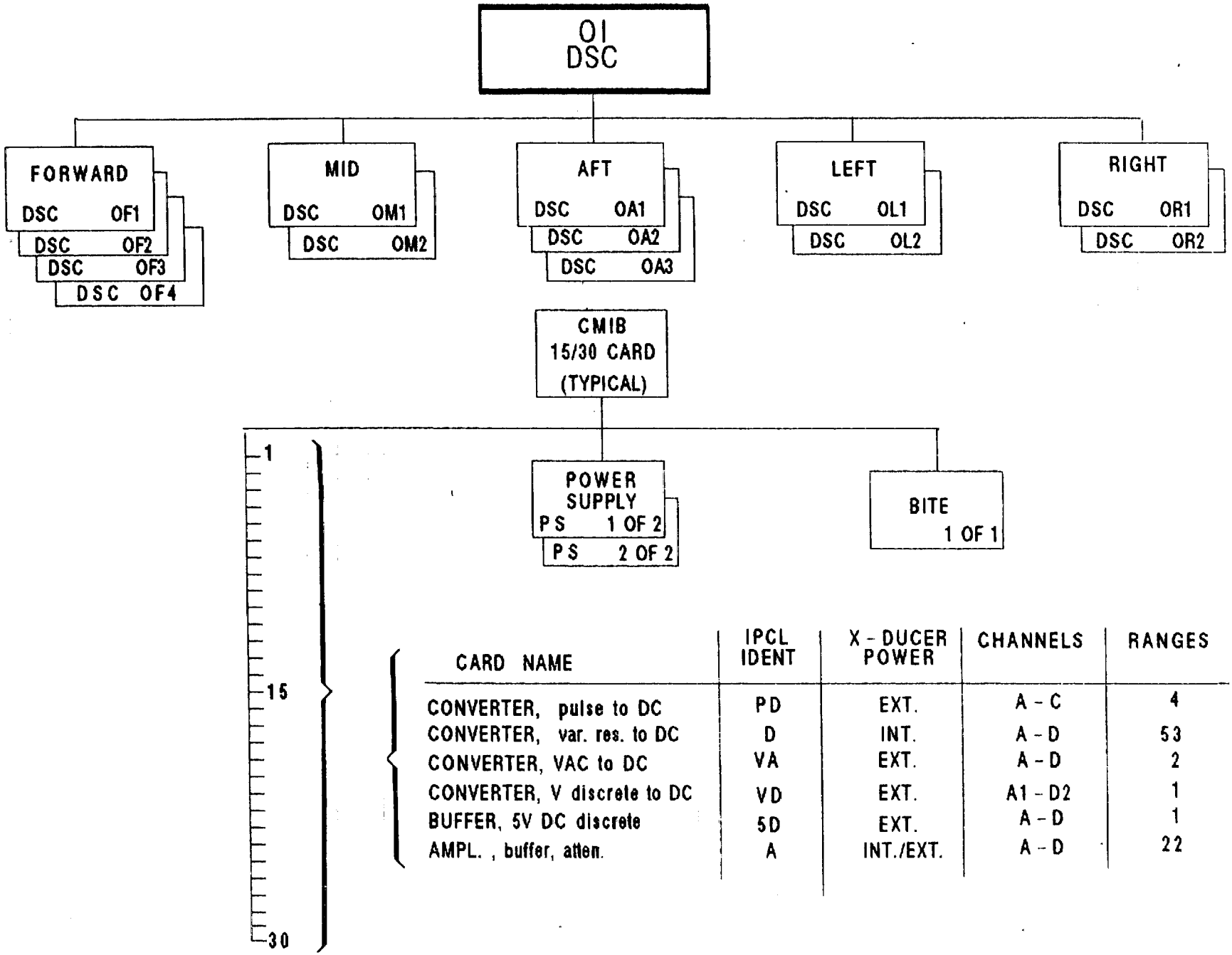


Figure 5 - OI MDM DETAILED REPRESENTATION

OI DSC DETAILED SYSTEM REPRESENTATION



CARD NAME	IPCL IDENT	X-DUCER POWER	CHANNELS	RANGES
CONVERTER, pulse to DC	PD	EXT.	A - C	4
CONVERTER, var. res. to DC	D	INT.	A - D	53
CONVERTER, VAC to DC	VA	EXT.	A - D	2
CONVERTER, V discrete to DC	VD	EXT.	A1 - D2	1
BUFFER, 5V DC discrete	5D	EXT.	A - D	1
AMPL., buffer, atten.	A	INT./EXT.	A - D	22

Figure 6 - DSC DETAILED REPRESENTATION

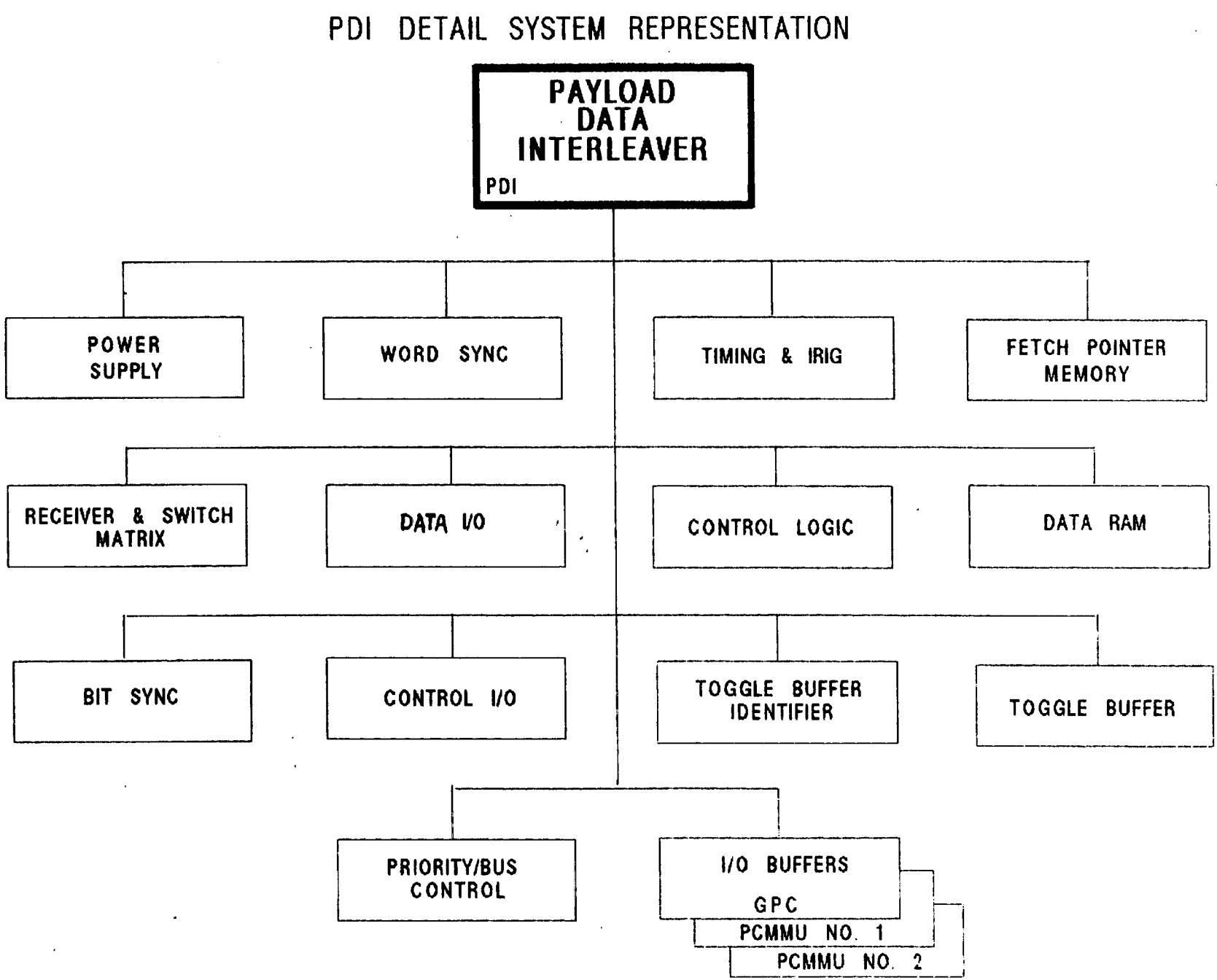


Figure 7 - PDI DETAILED REPRESENTATION

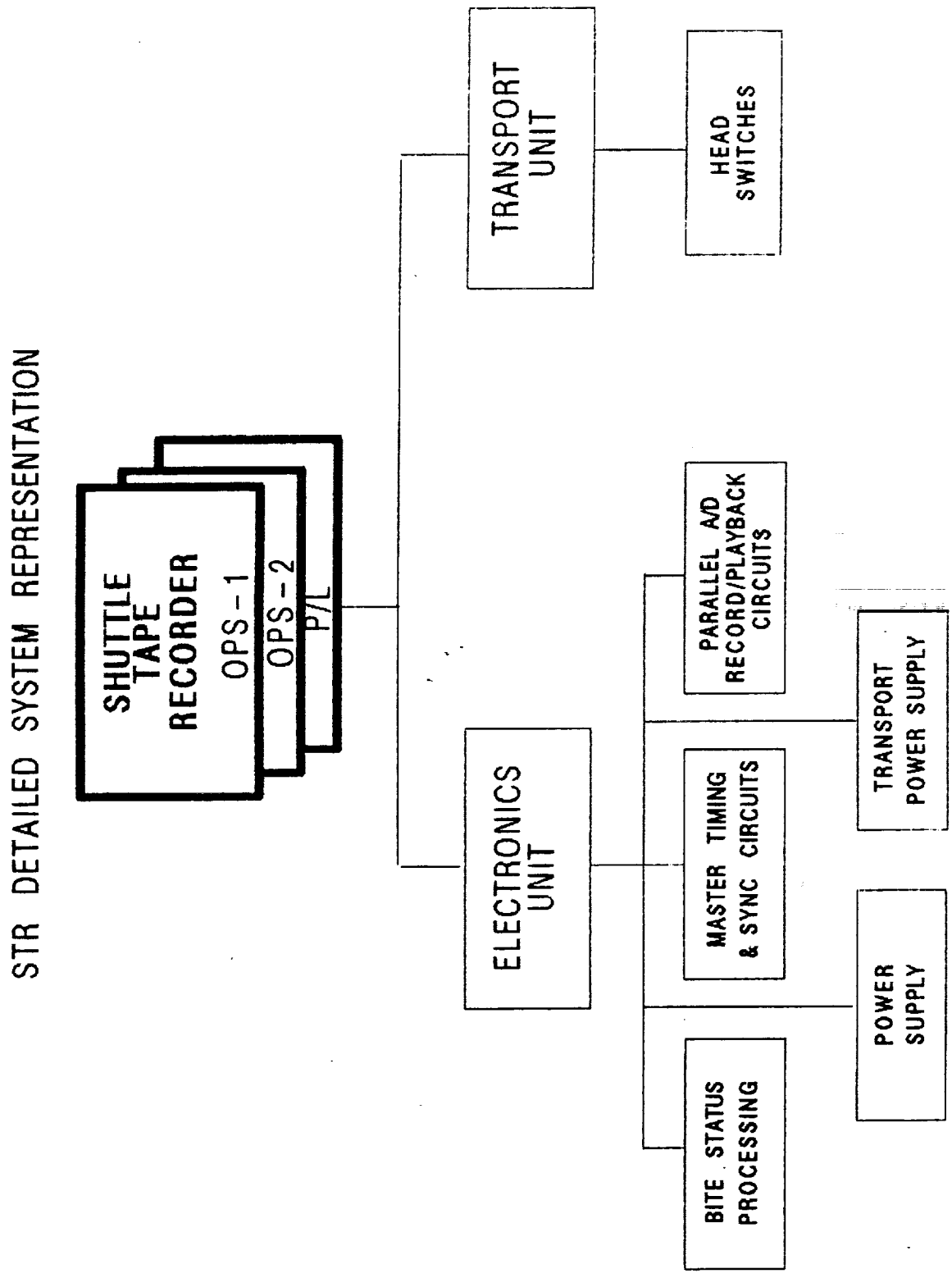


Figure 8 - STR DETAILED REPRESENTATION

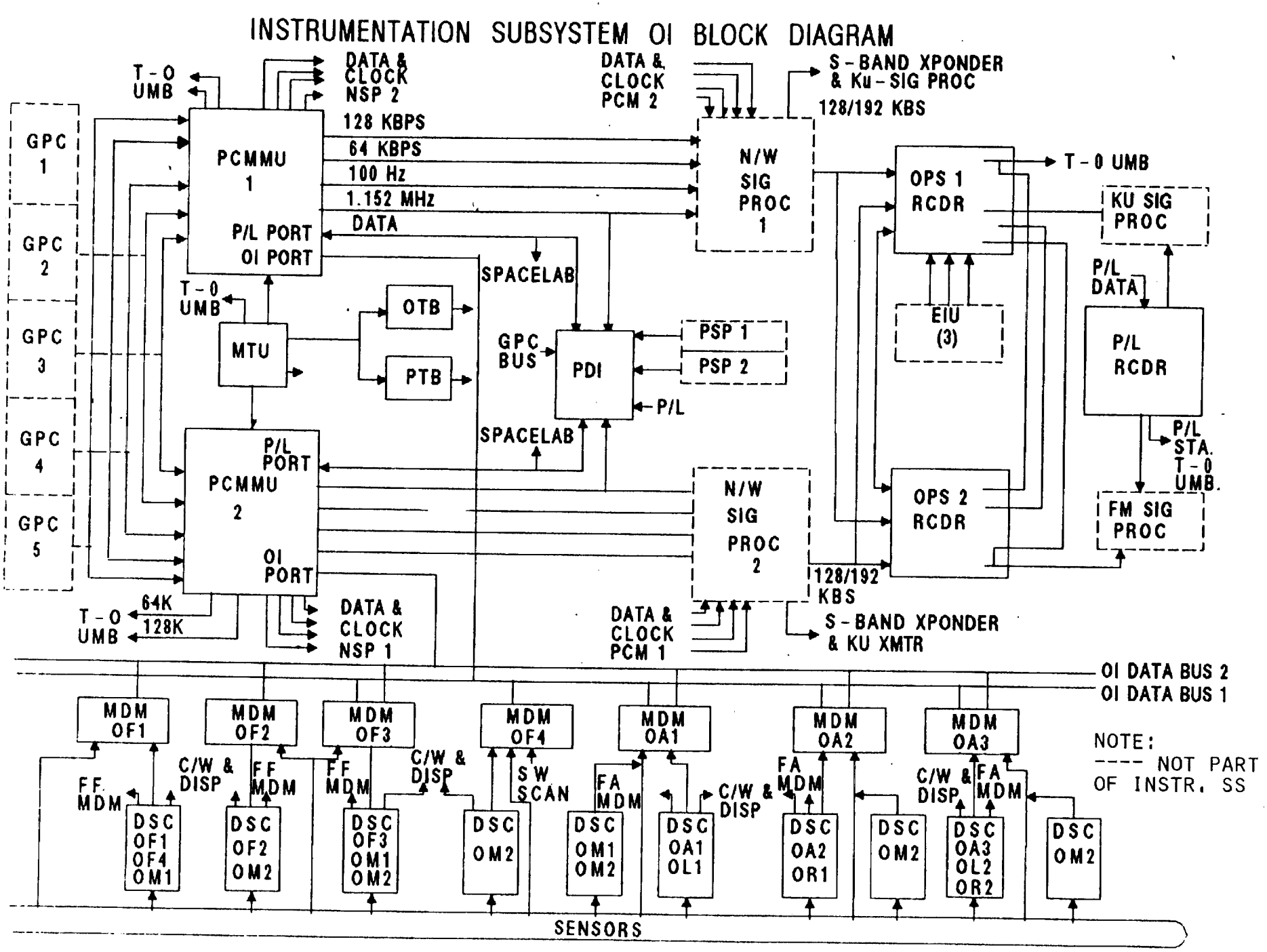


Figure 9 - OI FUNCTIONAL BLOCK DIAGRAM

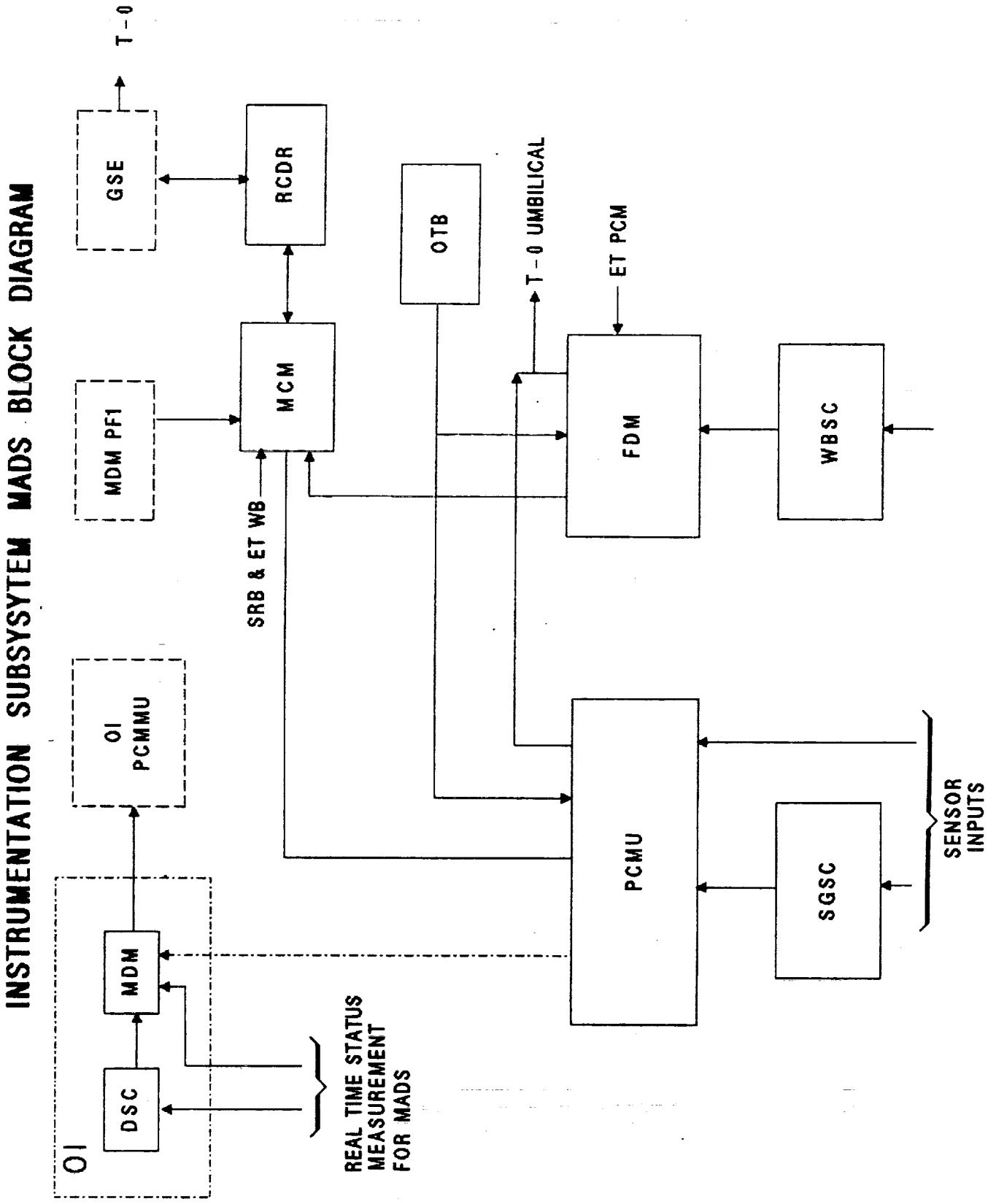


Figure 10 - MADS FUNCTIONAL BLOCK DIAGRAM

4.0 ASSESSMENT RESULTS

The IOA analysis of the Instrumentation hardware initially generated eighty-eight failure mode worksheets and identified eight Potential Critical Items (PCIs) before starting the assessment process. These analysis results were compared to a NASA baseline which was frozen as of 1 January 1988, with fourteen post 51L FMEAs included in a total of ninety-six FMEAs and eighteen CIL items, which were generated using the referenced FMEA/CIL instructions. Upon completion of the assessment, eighty-two of the one-hundred-seven FMEAs were in agreement. Of the twenty-five that remained, four are 2/2 criticality and not currently on the NASA CIL list, one CIL is assigned a different criticality and seven new FMEAs were generated which had no NASA match. The remaining fourteen FMEAs are of a different criticality than the NASA interpretation. None of these fourteen FMEAs affect the CIL listing.

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

Table I SUMMARY OF IOA FMEA ASSESSMENT

Component	NASA	IOA	Issues
MTU	4	4	-
PCMMU	11	11	-
MDM	9	14	5
DSC	10	15	5
PDI	4	4	-
OPS REC	9	9	-
P/L REC	7	7	-
OTB	3	3	-
PTB	5	5	-
MADS	18	19	1
SENSORS	16	16	-
TOTAL	96	107	11

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

Table II SUMMARY OF IOA CIL ASSESSMENT

Component	NASA	IOA	Issues
MTU	3	3	-
PCMMU	7	7	-
MDM	5	9	4
DSC	-	-	-
PDI	3	3	-
OPS REC	-	-	-
P/L REC	-	-	-
OTB	-	-	-
PTB	-	-	-
MADS	-	-	-
SENSORS	-	-	-
TOTAL	18	22	4

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 IOA analysis worksheets supplementing previous analysis results reported in Space Transportation System Engineering and Operations Support (STSEOS) Working Paper No. 1.0-WP-VA86001-017, Analysis of the Instrumentation, 19 December 1986. 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
MTU	-	-	3	-	1	-	4
PCMMU	-	-	4	-	3	4	11
MDM	-	2	5	3	4	-	14
DSC	-	-	-	4	6	5	15
PDI	-	-	-	-	4	-	4
OPS	-	-	-	-	-	9	9
P/L	-	-	-	-	5	2	7
OTB		-	-	-	-	3	3
PTB		-	-	-	-	5	5
MADS		-	-	-	-	19	19
SENSOR		-	-	-	-	16	16
TOTAL		2	12	7	23	63	107

Of the failur lyzed, twenty-two were determined to be critical items ry of the IOA recommended critical items is presented i

Table IV SU A RECOMMENDED CRITICAL ITEMS

Criticality:		R	2/2	3/1R	3/2R	3/3	TOTAL
MTU			3	-	-	-	3
PCMMU			4	-	3	-	7
MDM			5	2	-	-	9
DSC			-	-	-	-	-
PDI			-	-	3	-	3
OPS REC			-	-	-	-	-
P/L REC	-		-	-	-	-	-
OTB	-		-	-	-	-	-
PTB	-		-	-	-	-	-
MADS	-		-	-	-	-	-
SENSORS	-		-	-	-	-	-
TOTAL			2	6	-	22	

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
MTU	131-134
PCMMU	121-128, 231-233
MDM	112-118
DSC	101-111, 302-305
PDI	161-164
Ops Rec	171-177
P/L Rec	181-186
OTP	151-153
PTB	141-144, 154
MADS	201-214, 221-222, 241-256
Sensors	218, 261-301

4.1 MTU Assessment Results

The IOA assessment produced four FMEAs, three of which were given a 2/2 criticality as CILs.

4.2 PCMMU Assessment Results

The IOA assessment produced eleven FMEAs, four of which were given 2/2 criticality and three given 3/2R criticality as CILs.

4.3 MDM Assessment Results

The IOA assessment produced fourteen FMEAs, of which two were given 2/1R, five 2/2, and two 3/1R criticality as CILs. One of the IOA 2/1R CILs was an issue with the NASA 2/2 criticality.

4.4 DSC Assessment Results

The IOA assessment produced fifteen FMEAs, of which none were given CIL status.

4.5 PDI Assessment Results

The IOA assessment produced four FMEAs, of which three were given 3/2R criticality as CILs.

4.6 Operations Recorder Assessment Results

The IOA assessment produced nine FMEAs, none of which were of CIL criticality.

4.7 Payload Recorder Assessment Results

The IOA assessment produced seven FMEAs, none of which were of CIL criticality.

4.8 OTB Assessment Results

The IOA assessment produced three FMEAs, none of which were of CIL criticality.

4.9 PTB Assessment Results

The IOA assessment produced five FMEAs, none of which were of CIL criticality.

4.10 MADS Assessment Results

The IOA assessment produced nineteen FMEAs, none of which were of CIL criticality.

4.11 Sensors Assessment Results

The IOA assessment produced sixteen FMEAs, none of which were of CIL criticality.

5.0 REFERENCES

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

1. JSC-11174, Space Shuttle Systems Handbook, Rev. C, 9-12-85

2. JSC-18611, INCO/COMM Systems Brief, Rev. C, PCN-3, 8-15-83

3. Shuttle Flight Operations Manual Volume 4E - Instrumentation, 7-85

4. JSC-12820, STS Operational Flight Rules, PCN-1, 2-14-86

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

6. Schematic VS70-974099 (OI)

7. Schematic VS72-978099, EO A14 (MADS)

8. Schematic VS72-978102 (MADS)

9. Schematic VS72-941102 (FASCOS)

10. Main Engine ICD 13M 15000 (FASCOS)

11. NSTS 08171, Operations and Maintenance Requirements and Specifications Document (OMRSD), 10-15-86

12. TD203, Communications/Instrument Workbook COM/IN2102, 2-85 (Crew Training Workbook)

13. MC476-0130, Specification, Master Unit, Pulse Code Modulation, Rev. D, 4-30-82

APPENDIX A
ACRONYMS

ACIP	Aerodynamics Coefficient Instrumentation Package
AOA	Abort Once Around
ARPCS	Atmospheric Revitalization Pressure Control System
AV	Avionics
BFS	Backup Flight System
Calibr	Calibration
CCTV	Closed Circuit Television
CIL	Critical Items List
CRIT	Criticality
DFI	Development Flight Instrumentation
DFL	Decommutator Format Load
Dk	Deck
DOD	Department of Defense
DSC	Dedicated Signal Conditioner
EIU	Engine Interface Unit
Ena	Enable
ET	External Tank
F	Functional
FASCOS	Flight Acceleration Safety Cutoff System
FDM	Frequency Division Multiplexer
Flt	Flight
FMEA	Failure Modes and Effects Analysis
Fwd	Forward
GMT	Greenwich Meridien Time
GPC	General Purpose Computer
GSE	Ground Support Equipment
IFM	In-Flight Maintenance
INCO/COMM	Instrumentation and Communication Officer - Communications
INST	Instrumentation
IOA	Independent Orbiter Assessment
ips	Inches per second
IRIG B	Interrange Instrumentation Group B-format
LRU	Line Replacement Unit
MADS	Modular Auxiliary Data System
Man	Manual
MCM	MADS Control Module
MDAC	McDonnell Douglas Astronautics Company
MDM	Multiplexer/Demultiplexer
MET	Mission Elapsed Time
MIA	Multiplexer Interface Adapter
MTU	Master Timing Unit
MUX	Multiplex
NA	Not Applicable
NASA	National Aeronautics and Space Administration
NSP	Network Signal Processor (Communications Subsystem)
OA	Operational Aft
OF	Operational Forward

OI	Operational Instrumentation
OMRSD	Operational Maintenance Requirements and Specifications Document
OMS	Orbital Maneuvering System
OPS	Operations, Operational
OTB	Orbiter Timing Buffer
PCI	Potential Critical Item
PCM	Pulse Code Modulation
PCMMU	PCM Master Unit (OI)
PCMU	PCM Multiplexer Unit (MADS)
PDA	Power Distribution Assembly
PDI	Payload Data Interleaver
PL,P/L	Payload
Pnl	Panel
POGO	Acceleration/Vibration Along Thrust Axis
PTB	Payload Timing Buffer
PWR	Power
QC	Quality Control
RTLS	Return to Launch Site
SFOM	Shuttle Flight Operations Manual
SGSC	Strain Gage Signal Conditioner
SM	Systems Management
SPF	Single Point of Failure
SRB	Solid Rocket Booster
SSSH	Space Shuttle Systems Handbook
STR	Shuttle Tape Recorder
STS	Space Transportation System
SW	Switch
SYS	System
T-O	Time Zero
TAL	Trans-Atlantic Abort Landing
TFL	Telemetry Format Load
TPS	Thermal Protection System
VCO	Voltage-Controlled Oscillator
WBSC	Wideband Signal Conditioner

APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.1 Definitions

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

INTACT ABORT DEFINITIONS:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

OPS - software operational sequence

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

PHASE DEFINITIONS:

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

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

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

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

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

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.2 IOA Project Level Ground Rules and Assumptions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B.3 Instrumentation Subsystem - Specific Ground Rules and Assumptions

1. Sensors and transducers and associated individual or integral signal conditioners used within a subsystem will be analyzed by specialists assessing that subsystem.

   Rationale: The subsystem analyst is the person best qualified to identify credible failure modes/causes and to assess the effects/ criticalities of those failures.

2. Human error (e.g., misconfiguration by crew or ground) will not be considered.

   Rationale: Possible misconfigurations are out of scope for this analysis.

3. Inadvertent misconfigurations (e.g., accidental body contact by crew member with a switch in zero-g operations) will not be considered.

   Rationale: Most critical switches have guards, or are lever-lock type. Possible inadvertent misconfigurations are out of scope for this analysis.

4. Hardware items have been properly qualified, have passed applicable acceptance testing, and have been properly installed in the Orbiter. Exception: if analysis of LRU/subassembly/piece-part failure history discloses multiple failures for a particular item, that item will be individually examined for design/QC deficiencies, and will be flagged for special attention.

   Rationale: Baseline assumption is that program controls have resulted in hardware that is properly qualified and installed.

5. The criticality of an Instrumentation SS hardware item will be assigned on the basis of the highest criticality of any parameter or measurement traversing it.

   Rationale: Instrumentation exists as a service to other subsystems and to give insight into their status; the criticality of any path(s) within it is determined by the criticality of measurements utilizing it.

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
- 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 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)

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-101
NASA FMEA #: 05-4-220200-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 101
ITEM: DSC OF4, OM2, OL1/2, OR1/2

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
REDUNDANCY SCREENS IMPROPERLY APPLIED IN IOA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-102
NASA FMEA #:

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 102
ITEM: DSC OF1, OF2, OF3

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R] [P] [P] [P] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO NASA FMEA COUNTERPART. ERRONEOUS DATA COULD CAUSE MISSION ABORT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-103
NASA FMEA #: 05-4-220200-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 103
ITEM: DSC OF1, OF2, OF3

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
CORRESPONDS TO NASA GENERIC FMEA. NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-104
NASA FMEA #:

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 104
ITEM: DSC OA1, OA2, OA3, OM1

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R] [P] [F] [P] [A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO NASA COUNTERPART FMEA IN PRE-51L BASELINE. THESE DSC's HANDLE CRITICAL APU MEASUREMENTS. ERRONEOUS OUTPUT COULD PROMPT UNNECESSARY MANUAL SHUTDOWN OF AN APU, REQUIRING ABORT. FAILS SCREEN B BECAUSE FAILED DSC CHANNEL COULD NOT BE IDENTIFIED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-105
NASA FMEA #:

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 105
ITEM: DSC OA1, OA2, OA3, OM1

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO NASA COUNTERPART FMEA IN PRE-51L BASELINE. THESE DSC's HANDLE CRITICAL APU MEASUREMENTS. ERRONEOUS OUTPUT COULD PROMPT UNNECESSARY MANUAL SHUTDOWN OF AN APU, REQUIRING ABORT. FAILS SCREEN B BECAUSE FAILED DSC CHANNEL COULD NOT BE IDENTIFIED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-106
NASA FMEA #: 05-6R-220204-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 106
ITEM: CIRCUIT BREAKER, 5A, (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R] [P] [P] [P] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA DOES NOT CONCUR WITH NASA's EVALUATION. CRITICAL ARPCS MEASUREMENTS ARE PROCESSED BY DSCs OF1 AND OF4. LOSS OF FUNCTION AFTER SECOND FAILURE COULD AFFECT MISSION IF SUBSYSTEM MEASUREMENT WAS OUT OF TOLERANCE AND WENT UNDETECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-106
NASA FMEA #: 05-4-220200-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 106
ITEM: DSC 0F4, OM2, OL1/2, OR1/2

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-107
NASA FMEA #: 05-6R-220206-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 107
ITEM: CIRCUIT BREAKER, 5A, (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA DOES NOT CONCUR WITH NASA EVALUATION. ARPCS CRITICAL MEASUREMENTS ARE PROCESSED BY DSCs OF2 AND OF3. LOSS OF FUNCTION AFTER SECOND FAILURE COULD AFFECT MISSION IF SUBSYSTEM MEASUREMENT WAS OUT OF TOLERANCE AND WENT UNDETECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-108
NASA FMEA #: 05-6R-220201-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 108
ITEM: POWER AND CONTROL CIRCUIT DSC OA1, 2, 3 (3)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA DOES NOT CONCUR WITH NASA's EVALUATION. CRITICAL APU MEASUREMENTS ARE PROCESSED BY DSCs OA1, OA2 AND OA3. LOSS OF FUNCTION AFTER SECOND FAILURE COULD AFFECT CREW/VEHICLE IF SUBSYSTEM MEASUREMENT WAS OUT OF TOLERANCE AND WENT UNDETECTED. SEE RELATED IOA 104.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-109
NASA FMEA #: 05-6R-220205-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 109
ITEM: CIRCUIT BREAKER, 5A, (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA DOES NOT CONCUR WITH NASA's EVALUATION. CRITICAL APU MEASUREMENTS ARE PROCESSED BY DSC OM1. LOSS OF FUNCTION AFTER SECOND FAILURE COULD AFFECT CREW/VEHICLE IF SUBSYSTEM MEASUREMENTS WERE OUT OF TOLERANCE AND WENT UNDETECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-110
NASA FMEA #: 05-6R-220203-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 110
ITEM: POWER AND CONTROL CIRCUIT DSC OR1 AND 2 (3)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-111
NASA FMEA #: 05-6R-220202-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 111
ITEM: POWER AND CONTROL CIRCUIT, DSC-OL1 & 2 (3)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-112
NASA FMEA #:

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 112
ITEM: MDM OF1, OF2

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO NASA FMEA COUNTERPART. CRITICAL ARPCS MEASUREMENTS ARE HANDLED BY THESE MDM's.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-113
NASA FMEA #: 05-5-B03-7-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 113
ITEM: MDM OF4, OA1, OA2, OA3

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[ ]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
NASA FMEA ASSIGNS CRIT 2/1R BECAUSE INITIAL MDM FAILURE PLUS A SUBSEQUENT FAILURE OF A FUEL CELL HEATER RELAY OR APU FUEL LINE HEATER RELAY IMPROPERLY LEAVING HEATER ON COULD CAUSE UNDETECTED CONDITION RESULTING IN POSSIBLE EXPLOSION. AGREE WITH NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-114
NASA FMEA #: 05-5-B03-6-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 114
ITEM: MDM OF3

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /2R]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-115
NASA FMEA #: 05-6R-221502-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 115
ITEM: CIRCUIT BREAKER 7.5 A

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /2R]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-115
NASA FMEA #: 05-5-B03-7-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 115
ITEM: MDM OA1, OA2, OA3

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[N]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [F] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA FMEA ASSIGNS FAIL TO SCREEN B BECAUSE SOURCE OF ERRONEOUS OUTPUT CANNOT BE IDENTIFIED. AGREE WITH NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-116
NASA FMEA #: 05-6R-221503-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 116
ITEM: CIRCUIT BREAKER 7.5A (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /2R]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-117
NASA FMEA #: 05-6R-221501-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 117
ITEM: POWER AND CONTROL CIRCUIT MDM OA1, 2, 3, CRITICALITY 3 COMPONENTS

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /2R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

	[3 /1R]	[P]	[F]	[P]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
DISAGREE WITH NASA FMEA CRITICALITY ASSIGNMENT BECAUSE LOSS OF ALL INSIGHT INTO CRITICAL APU MEASUREMENTS HANDLED BY MDMs OA1, OA2, OA3 COULD RESULT IN LOSS OF CREW/VEHICLE. FAILS SCREEN B BECAUSE ONE OF THE REDUNDANT RPC OUTPUTS FOR AN MDM COULD BE LOST WITH NO INDICATION TO CREW OR GROUND.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-118
NASA FMEA #: 05-6R-221504-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 118
ITEM: SWITCH, TOGGLE 3P2T

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[ ]	[ ]	[ ]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[P]	[F]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
CRITICAL APU AND FUEL CELL MEASUREMENTS ARE HANDLED BY THE AFFECTED MDM's, AND THEIR LOSS COULD THREATEN CREW/VEHICLE SAFETY, BECAUSE CRITICAL CONDITIONS/FAILURES COULD BE MASKED. RECOMMEND UPGRADING TO 2/1R. FAILS SCREEN B BECAUSE THERE WOULD BE
NO INSIGHT INTO THOSE MASKED CONDITIONS DURING FLIGHT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-121
NASA FMEA #: 05-4-220400-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 121
ITEM: PULSE CODE MODULATION MASTER UNIT (PCMMU)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /2R]	[P]	[NA]	[P]	[ ]
COMPARE	[N /N]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[NA]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
SCREEN B SHOULD BE NA BECAUSE ONE UNIT IS IN INACTIVE STANDBY. NASA FMEA ASSIGNS CRIT 2/1R BECAUSE LOSS OF BOTH PCMMU's COULD CAUSE LOSS OF FAULT DETECTION PARAMETERS THAT COULD AFFECT CREW/VEHICLE SAFETY. AGREE WITH NASA CRIT. NOTE: PRESENT FLIGHT RULES CALL FOR MINIMUM DURATION FLIGHT ON LOSS OF FIRST PCMMU.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-122
NASA FMEA #: 05-4-220400-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 122
ITEM: PULSE CODE MODULATION MASTER UNIT (PCMMU)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /2R]	[P]	[NA]	[P]	[ ]
COMPARE	[N /N]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[NA]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
SCREEN B SHOULD BE NA BECAUSE ONE UNIT IS IN INACTIVE STANDBY. NASA HAS UPGRADED THIS TYPE OF FAILURE MODE FROM 3/2R TO 2/1R ON PREMISE THAT LOSS OF BOTH PCMMUs COULD CAUSE LOSS OF FAULT DETECTION PARAMETERS THAT COULD AFFECT CREW/VEHICLE SAFETY. AGREE WITH NASA CRIT. NOTE: PRESENT FLIGHT RULES CALL FOR MINIMUM DURATION FLIGHT ON LOSS OF FIRST PCMMU.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-123
NASA FMEA #: 05-4-220400-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 123
ITEM: PULSE CODE MODULATION MASTER UNIT (PCMMU)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /2R]	[P]	[NA]	[P]	[ ]
COMPARE	[N /N]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[NA]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
SCREEN B SHOULD BE NA BECAUSE ONE UNIT IS IN INACTIVE STANDBY. NASA HAS UPGRADED THIS TYPE OF FAILURE MODE FROM 3/2R TO 2/1R ON PREMISE THAT LOSS OF BOTH PCMMUs COULD CAUSE LOSS OF FAULT DETECTION PARAMETERS THAT COULD AFFECT CREW/VEHICLE SAFETY. AGREE WITH NASA CRIT. NOTE: PRESENT FLIGHT RULES CALL FOR MINIMUM DURATION FLIGHT ON LOSS OF FIRST PCMMU.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-124
NASA FMEA #: 05-4-220402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 124
ITEM: PCMMU FORMAT CONTROL SWITCH

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[ ]	[ ]	[ ]	[X] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-125
NASA FMEA #: 05-4-220402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 125
ITEM: PCMMU FORMAT CONTROL SWITCH

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[ ]	[ ]	[ ]	[ ] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-126
NASA FMEA #: 05-4-220402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 126
ITEM: PCMMU FORMAT CONTROL SWITCH

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[ ]	[ ]	[ ]	[ ] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87 NASA DATA:
ASSESSMENT ID: EPDC/INSTR-127 BASELINE [X]
NASA FMEA #: 05-6R-220401-1 NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 127
ITEM: PCM POWER AND CONTROL CIRCUIT, CRITICALITY 3
COMPONENTS (3)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /2R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
AGREE WITH NASA FMEA CRITICALITY ASSIGNMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-128
NASA FMEA #: 05-6R-220402-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 128
ITEM: SWITCH TOGGLE, 3P3T (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
LATEST NASA FEMA ASSIGNS CRIT 2/1R ON PREMISE SUBSEQUENT FAILURE IN A CRITICAL SUBSYSTEM COULD CAUSE LOSS OF CREW/VEHICLE, BECAUSE PCMMU HANDLES OI DATA, AND CRITICAL SUBSYSTEM FAILURES COULD BE CANCELED. AGREE WITH NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-131
NASA FMEA #: 05-4-321200-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 131
ITEM: MASTER TIMING UNIT (MTU)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[F]	[X] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[2 /2]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
INVESTIGATIONS CONTINUE TO RECONCILE DIVERSITY OF OPINION WITHIN NASA ON MTU CRIT. THESE ARE SPF's THAT COULD CAUSE LOSS OF MTU FUNCTION. AGREE WITH NASA FMEA BECAUSE LOSS OF MTU PREVENTS BFS OPS AND MTU FAILS SCREEN C BECAUSE OF SPF's.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-132
NASA FMEA #: 05-4-321200-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 132
ITEM: MASTER TIMING UNIT (MTU)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[F]	[X] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[2 /2]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
INVESTIGATIONS CONTINUE TO RECONCILE DIVERSITY OF OPINION WITHIN NASA ON MTU CRIT. THESE ARE SPF's THAT COULD CAUSE LOSS OF MTU FUNCTION. AGREE WITH NASA FMEA BECAUSE LOSS OF MTU PREVENTS BFS OPS AND MTU FAILS SCREEN C BECAUSE OF SPF's.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-133
NASA FMEA #: 05-4-321200-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 133
ITEM: MASTER TIMING UNIT (MTU)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[F]	[X] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[2 /2]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
INVESTIGATIONS CONTINUE TO RECONCILE DIVERSITY OF OPINION WITHIN NASA ON MTU CRIT. THESE ARE SPF's THAT COULD CAUSE LOSS OF MTU FUNCTION. AGREE WITH NASA FMEA BECAUSE LOSS OF MTU PREVENTS BFS OPS AND MTU FAILS SCREEN C BECAUSE OF SPF's.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-134
NASA FMEA #: 05-6R-221201-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 134
ITEM: POWER AND CONTROL CIRCUIT, MTU (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA FMEA 05-6R-221201-1, PRE-51L BASELINE, ASSIGNS CRIT 3/1R, BUT WRITE-UP DOES NOT SUPPORT THAT CRIT ("LOSS OF MTU WILL NOT AFFECT CREW/VEHICLE" AND "POSSIBLE LOSS OF MISSION"). RECOMMEND CRIT 3/2R.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-141
NASA FMEA #: 05-4-221400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 141
ITEM: PAYLOAD TIMING BUFFER (PTB)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-142
NASA FMEA #: 05-4-221400-2

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 142
ITEM: PAYLOAD TIMING BUFFER (PTB)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-143
NASA FMEA #: 05-4-221400-2

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 143
ITEM: PAYLOAD TIMING BUFFER (PTB)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/26/88
ASSESSMENT ID: EPDC/INSTR-144X
NASA FMEA #: 05-4-221401-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPD&C/INSTRUMENTATION
MDAC ID: 144
ITEM: CIRCUIT BREAKER, 5-AMP, PAYLOAD TIMING BUFFER

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-151
NASA FMEA #: 05-4-221500-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 151
ITEM: ORBITER TIMING BUFFER (OTB)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-152
NASA FMEA #: 05-4-221500-2

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 152
ITEM: ORBITER TIMING BUFFER (OTB)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-153
NASA FMEA #: 05-4-221500-2

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 153
ITEM: ORBITER TIMING BUFFER (OTB)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/26/88 NASA DATA:
ASSESSMENT ID: EPDC/INSTR-154X BASELINE [X]
NASA FMEA #: 05-4-221501-1 NEW [ ]

SUBSYSTEM: EPD&C/INSTRUMENTATION
MDAC ID: 154
ITEM: CIRCUIT BREAKER, 5-AMP, PAYLOAD TIMING BUFFER

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-161
NASA FMEA #: 05-4-221300-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 161
ITEM: PAYLOAD DATA INTERLEAVER (PDI)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[ ]	[ ]	[ ]	[X] *
IOA	[3 /2R]	[P]	[NA]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA CRIT CONSIDERED AVAILABILITY OF SPARE PDI CARRIED ON FLIGHTS FOR WHICH PDI IS MISSION CRITICAL, BUT PDI SUBSTITUTION REQUIRES OFF-NOMINAL CREW ACTIVITY. AGREE WITH NASA CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-162
NASA FMEA #: 05-4-221300-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 162
ITEM: PAYLOAD DATA INTERLEAVER (PDI)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[ ]	[ ]	[ ]	[X] *
IOA	[3 /2R]	[P]	[NA]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA CRIT CONSIDERED AVAILABILITY OF SPARE PDI CARRIED ON FLIGHTS FOR WHICH PDI IS MISSION CRITICAL, BUT PDI SUBSTITUTION REQUIRES OFF-NOMINAL CREW ACTIVITY. AGREE WITH NASA CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-163
NASA FMEA #: 05-4-221300-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 163
ITEM: PAYLOAD DATA INTERLEAVER (PDI)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[ ]	[ ]	[X]	[X] *
IOA	[3 /2R]	[P]	[NA]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA CRIT CONSIDERED AVAILABILITY OF SPARE PDI CARRIED ON FLIGHTS FOR WHICH PDI IS MISSION CRITICAL, BUT PDI SUBSTITUTION REQUIRES OFF-NOMINAL CREW ACTIVITY. AGREE WITH NASA CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-164
NASA FMEA #: 05-6R-221301-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 164
ITEM: POWER AND CONTROL CIRCUIT, PDI (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
N	3]	[ ]	[ ]	[ ]	[ ] *
	/2R]	[P]	[P]	[P]	[ ]
COM	/N]	[N]	[N]	[N]	[ ]

RE ONS: (If different from NASA)

3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

NTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

TROL CIRCUIT IS REDUNDANT. LOSS OF POWER TO PDI AND T LOSS OF PDI FUNCTION COULD CAUSE LOSS OF MISSION ES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-171
NASA FMEA #: 05-4-221000-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 171
ITEM: SHUTTLE TAPE RECORDER OPS 1&2

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCE IN CRIT ASSIGNMENT. THE SCREENS SHOULD NOT BE RATED FOR A 3/3 CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-172
NASA FMEA #: 05-4-221001-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 172
ITEM: SWITCH MODE RECORD/STANDBY/PLAYBACK FOR OPS 1 & OPS 2 STRS

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-173
NASA FMEA #: 05-4-221003-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 173
ITEM: SWITCH MODE, OPS 1 & 2 ANOMALY START/OFF/ERASE

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[/]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA SHOULD HAVE ASSIGNED 3/3 CRITICALITY. AGREE WITH NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87 NASA DATA:
ASSESSMENT ID: INSTR-174 BASELINE [X]
NASA FMEA #: 05-4-221002-1 NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 174
ITEM: SWITCH, MODE LOOP/MAINT OPS 1 & 2 STRS

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[/]	[ ]	[ ]	[ ]	[ ]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA SHOULD HAVE ASSIGNED 3/3 CRITICALITY. AGREE WITH NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/26/88 NASA DATA:
ASSESSMENT ID: INSTR-175X BASELINE [X]
NASA FMEA #: 05-4-221004-1 NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 175
ITEM: EVENT INDICATOR - OPS RECORDER CONTROL MODE

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-176
NASA FMEA #: 05-6R-221001-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 176
ITEM: POWER AND CONTROL CIRCUIT, OPS RCDR 1, (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCE IN CRITICALITY. THE SCREEN SHOULD NOT BE RATED FOR 3/3 CRIT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/26/88
ASSESSMENT ID: INSTR-176X
NASA FMEA #: 05-4-221004-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 176
ITEM: EVENT INDICATOR, OPS RECORDER OPERATIONAL MODE

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87 NASA DATA:
ASSESSMENT ID: EPDC/INSTR-177 BASELINE [ ]
NASA FMEA #: 05-6R-221001-1 NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 177
ITEM: POWER AND CONTROL CIRCUIT, OPS RCDR 2, (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCE IN CRITICALITY. THE SCREENS SHOULD NOT BE RATED FOR 3/3 CRIT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/26/88
ASSESSMENT ID: INSTR-177X
NASA FMEA #: 05-4-221004-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 177
ITEM: EVENT INDICATOR - ANOMALY SEQUENCE TALKBACK

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-181
NASA FMEA #: 05-4-221100-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 181
ITEM: SHUTTLE TAPE RECORDER-PAYLOAD

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
LOSS OF ALL CAPABILITY TO ROUTE PAYLOAD DATA TO GROUND, EITHER VIA PLAYBACK OR REAL-TIME, COULD CAUSE LOSS OF MISSION OBJECTIVES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-182
NASA FMEA #: 05-4-221103-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 182
ITEM: SWITCH, ROTARY P/L STR MODE SELECT

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
LOSS OF ALL CAPABILITY TO CONTROL PAYLOAD RECORDER MODE COULD CAUSE LOSS OF MISSION OBJECTIVES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-183
NASA FMEA #: 05-4-221101-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 183
ITEM: SWITCH, OPERATE/ERASE-PAYLOAD STR

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
LOSS OF ALL CAPABILITY TO SELECT OPERATE/ERASE FUNCTION COULD CAUSE LOSS OF MISSION OBJECTIVES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-184
NASA FMEA #: 05-4-221102-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 184
ITEM: SWITCH, ROTARY P/L STR SPEED CONTROL

LEAD ANALYST: B. HOWARD

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
LOSS OF ALL CAPABILITY TO CONTROL PAYLOAD RECORDER SPEED COULD CAUSE LOSS OF MISSION OBJECTIVES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-185
NASA FMEA #: 05-6R-221101-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 185
ITEM: POWER AND CONTROL CIRCUIT PAYLOAD RECORDER (2)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA DOES NOT CONCUR WITH NASA's EVALUATION. LOSS OF PAYLOAD DATA WILL NOT AFFECT CREW OR VEHICLE. BUT COULD CAUSE LOSS OF MISSION OBJECTIVES IN SPECIFIC CASES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/26/88
ASSESSMENT ID: INSTR-185X
NASA FMEA #: 05-4-221104-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 185
ITEM: EVENT INDICATOR - PAYLOAD RECORDER CONTROL
SOURCE

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/26/88
ASSESSMENT ID: INSTR-186X
NASA FMEA #: 05-4-221104-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 186
ITEM: EVENT INDICATOR - PAYLOAD RECORDER MODE TALKBACK

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-201
NASA FMEA #: 05-4-220300-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 201
ITEM: WIDE-BAND SIGNAL CONDITIONER (WBSC)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-202
NASA FMEA #: 05-6R-238501-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 202
ITEM: POWER AND CONTROL CIRCUIT WBSC EQUIPMENT (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-203
NASA FMEA #: 05-6R-238500-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 203
ITEM: POWER DISTRIBUTION ASSEMBLY

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-211
NASA FMEA #: 05-6R-238501-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 211
ITEM: WIDE BAND ACIP PCM SWITCH

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES IN CRITICALITY ASSIGNMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-212
NASA FMEA #: 05-4-230100-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 212
ITEM: STRAIN GAGE SIGNAL CONDITIONERS (SGSC'S)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87 NASA DATA:
ASSESSMENT ID: INSTR-213 BASELINE [X]
NASA FMEA #: 05-6R-238502-1 NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 213
ITEM: MADS STRAIN GAGE CONTROL SWITCH

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-214
NASA FMEA #: 05-6R-238502-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 214
ITEM: POWER CONTROL CIRCUIT SG/PCM (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-218
NASA FMEA #: 05-4-220700-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 218
ITEM: FASCOS

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C		CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]		[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]		[ ]
COMPARE	[/]	[ ]	[ ]	[ ]		[ ]
RECOMMENDATIONS: (If different from NASA)						
	[/]	[ ]	[ ]	[ ]		[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-221
NASA FMEA #: 05-4-220600-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 221
ITEM: FREQUENCY DIVISION MULTIPLEXER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-222
NASA FMEA #: 05-4-230601-1, -230602-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 222
ITEM: FDM CALIBRATION CONTROL

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-231
NASA FMEA #: 05-4-230400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 231
ITEM: PCM MUX

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-232
NASA FMEA #: 05-4-230401-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 232
ITEM: PCM MODE CONTROL SWITCH

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-233
NASA FMEA #: 05-4-230402-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 233
ITEM: PCM RECORD MODE SWITCH

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-241
NASA FMEA #: 05-4-238000-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 241
ITEM: MADS CONTROL MODULE (MCM)

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-242
NASA FMEA #: 05-6R-238001-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 242
ITEM: POWER & CONTROL CIRCUIT, MCM (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-243
NASA FMEA #: 05-6R-230601-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 243
ITEM: CIRCUIT, ET POWER DISTRIBUTION

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-251
NASA FMEA #: 05-4-230800-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 251
ITEM: MADS RECORDER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-252
NASA FMEA #: 05-4-230800-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 252
ITEM: MADS RECORDER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-253
NASA FMEA #: 05-4-230800-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 253
ITEM: MADS RECORDER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87 NASA DATA:
ASSESSMENT ID: INSTR-254 BASELINE [X]
NASA FMEA #: 05-4-230802-1 NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 254
ITEM: MADS RECORDER FORMAT CONTROL

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-255
NASA FMEA #: 05-4-230802-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 255
ITEM: MADS RECORDER FORMAT CONTROL

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-256
NASA FMEA #: 05-6R-230801-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 256
ITEM: POWER AND CONTROL CIRCUIT, MADS RCDR (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-261
NASA FMEA #: 05-4-230500-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 261
ITEM: REFERENCE JUNCTIONS

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-262
NASA FMEA #: 05-4-230500-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 262
ITEM: REFERENCE JUNCTIONS

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-263
NASA FMEA #: 05-4-236100-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 263
ITEM: STRAIN GAGE TRANSDUCER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-264
NASA FMEA #: 05-4-22400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 264
ITEM: ACCELEROMETER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-265
NASA FMEA #: 05-4-232200-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 265
ITEM: ACCELEROMETER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-266
NASA FMEA #: 05-4-237300-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 266
ITEM: PRESSURE TRANSDUCERS

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-267
NASA FMEA #: 05-4-236700-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 267
ITEM: RADIOMETER

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-268
NASA FMEA #: 05-4-236400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 268
ITEM: THERMOCOUPLE, FUSELAGE TPS

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-269
NASA FMEA #: 05-4-236300-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 269
ITEM: THERMOCOUPLE, LEFT WING ELEVON

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: INSTR-270
NASA FMEA #: 05-4-236200-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 270
ITEM: TEMPERATURE SENSORS

LEAD ANALYST: A. W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-271
NASA FMEA #:

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 271
ITEM: CIRCUIT BREAKER, 5A, (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-272
NASA FMEA #: 05-6R-213501-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 272
ITEM: FUSE, FPCA MN BUS A 1A (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-273
NASA FMEA #: 05-6R-213500-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 273
ITEM: FUSE, FPCA, MN BUS A 1A (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-274
NASA FMEA #: 05-6R-213400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 274
ITEM: CIRCUIT BREAKER, 5A (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/28/87
ASSESSMENT ID: EPDC/INSTR-275
NASA FMEA #: 05-6R-213401-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: EPDC/INSTRUMENTATION
MDAC ID: 275
ITEM: FUSE, FPCA-2, MN B, 1A (1)

LEAD ANALYST: T. EMMONS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-301X
NASA FMEA #: 05-4-220500-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 301
ITEM: VIBRATION MONITORING SYSTEM

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[ ]	[ ]	[ ]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-302X
NASA FMEA #: 05-4-220202-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 302
ITEM: DSCs OA1, OA2, OA3, OM1

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 107 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 107 AND IS BEING RESTORED AS IOA INSTR-302X. NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-303X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 303
ITEM: DSC OF3

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 108 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 108 AND IS BEING RESTORED AS IOA INSTR-303X. DSC OF3 HANDLES MEASUREMENTS OF ARPCS DP/DT AND CABIN PARTIAL PRESSURE, OXYGEN. LOSS OF ALL MEANS OF DETECTION OF CABIN PRESSURE LOSS WOULD CAUSE MISSION TERMINATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-304X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 304
ITEM: DSC OF3

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 109 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 109 AND IS BEING RESTORED AS IOA INSTR-304X. DSC OF3 HANDLES MEASUREMENTS OF ARPCS DP/DT AND CABIN PARTIAL PRESSURE, OXYGEN. ERRONEOUS MEASUREMENTS AND LOSS OF UNLIKE REDUNDANCY FOR MONITORING CABIN PRESSURE COULD CAUSE MISSION TERMINATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-305X
NASA FMEA #: 05-5-B03-7-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 305
ITEM: MDM OF4, OA1, OA2, OA3

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[F]	[P]	[X]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R] [P] [F] [P] [A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA 111 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 111 AND IS BEING RESTORED AS IOA INSTR-305X. THESE MDM's PROCESS/ROUTE CRITICAL APU STATUS DATA. ERRONEOUS OUTPUT FALSELY INDICATING A HEATER STUCK ON COULD PROMPT MANUAL SHUTDOWN OF AN APU, REQURING ABORT. FAILS SCREEN B BECAUSE FAILED MDM CHANNEL COULD NOT BE DETECTED. NOTE: NASA FMEA WRITEUP IS INCONSISTENT WITH 2/2 CRIT AND ASSIGNS SCREENS FOR THAT 2/2 CRIT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-306X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 306
ITEM: MDM OF3

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[2 /2]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 116 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 116 AND IS BEING RESTORED AS IOA INSTR-306X. FOR PRESENT FUEL CELLS, MDM OF3 HANDLES CRITICAL FUEL CELL MEASUREMENTS FOR WHICH THERE IS NO REDUNDANT PATH (SE IOA 306X). LOSS OF THESE MEASUREMENTS WOULD REQUIRE MISSION TERMINATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-307X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 307
ITEM: MDM OF3

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[2 /2]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 117 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 117 AND IS BEING RESTORED AS IOA INSTR-307X. FOR PRESENT FUEL CELLS, MDM OF3 HANDLES CRITICAL FUEL CELL MEASUREMENTS FOR WHICH THERE IS NO REDUNDANT PATH (SE IOA 307X). ERRONEOUS MEASUREMENTS COULD CAUSE IMPROPER MANUAL SHUTDOWN OF A FUEL CELL, REQUIRING UNNECESSARY MISSION TERMINATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-308X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 308
ITEM: MDM OF1, OF2

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /2] [ ] [ ] [ ] [A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 118 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 118 AND IS BEING RESTORED AS INSTR-308X. FOR PRESENT FUEL CELLS SYSTEM MDM's OF1 AND OF2 HANDLE CRITICAL FUEL CELL DELTA VOLTAGE MEASUREMENTS (SEE IOA 308). LOSS OF THESE MEASUREMENTS WOULD CAUSE MISSION TERMINATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-309X
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 309
ITEM: MDM OF1, OF2

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /2]	[ ]	[ ]	[ ]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 119 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 119 AND IS BEING RESTORED AS INSTR-309X. FOR PRESENT FUEL CELLS SYSTEM MDMs OF1 AND OF2 HANDLE CRITICAL FUEL CELL DELTA VOLTAGE MEASUREMENTS (SEE IOA 309). ERRONEOUS MDM OUTPUT COULD CAUSE A FALSE INDICATION OF FUEL CELL MALFUNCTION AND COULD PROMPT A MANUAL FUEL CELL SHUT DOWN THAT COULD CAUSE MISSION LOSS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/29/88
ASSESSMENT ID: INSTR-310X
NASA FMEA #: 05-5-B03-7-2

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: INSTRUMENTATION
MDAC ID: 310
ITEM: MDM OA1, OA2, OA3

LEAD ANALYST: A.W. ADDIS

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[P]	[F]	[P]	[X] *
IOA	[2 /2]	[ ]	[ ]	[ ]	[X]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA 120 WAS INADVERTENTLY OVERWRITTEN BY IOA EPD&C 120 AND IS BEING RESTORED AS INSTR-310X. CRITICAL APU FUEL LINE SYSTEM TEMPERATURES ARE HANDLED BY THESE MDM's. THEIR LOSS WOULD CAUSE MISSION TERMINATION. THE NASA FMEA WORDING IS INCONSISTENT WITH ASSIGNED CRITICALITY, AND SCREENS SHOULD NOT BE RATED FOR A 2/2 CRITICALITY.

APPENDIX D

CRITICAL ITEMS

APPENDIX D
POTENTIAL CRITICAL ITEMS

NASA FMEA	MDAC-ID	FLIGHT	ITEM	FAILURE MODE
	104	3/1R	DSC OA1, OA2, OA3, OM1	ERRONEOUS OUTPUT
05-5-B03-7-1	113	3/1R	MDM OF4, OA1, OA2, OA3	LOSS OF OUTPUT
05-5-B03-7-1	115	2/1R	MDM OA1, OA2, OA3	LOSS OF OUTPUT
05-6R-221501-1	117	3/3	PWR & CNTRL CIRCUIT	OPEN, SHORTED
05-6R-221504-1	118	3/1R	SWITCH, TOGGLE 3P2T	FAILS TO CLOSE
05-4-220400-1	121	3/2R	PULSE CODE MODULATION	LOSS OF OUTPUT
05-4-220400-2	122	3/2R	PULSE CODE MODULATION	ERRATIC OPERATION
05-4-220400-2	123	3/2R	PULSE CODE MODULATION	INTERMITTENT OPERATION
05-4-220402-1	124	2/2	PCMMU FORMAT CNTRL SW	PHYSICAL BINDING/ JAMMING
05-6R-220402-1	128	2/2	SWITCH TOGGLE, 3P3T (1)	FAILS TO CLOSE
05-4-321200-1	131	2/2	MASTER TIMING UNIT	LOSS OF OUTPUT
05-4-321200-2	132	2/2	MASTER TIMING UNIT	ERRONEOUS OUTPUT
05-4-321200-2	133	2/2	MASTER TIMING UNIT	ERRATIC OPERATION
05-4-221300-1	161	3/2R	PL DATA INTERLEAVER	LOSS OF OUTPUT
05-4-221300-1	162	3/2R	PL DATA INTERLEAVER	ERRATIC OPERATION
05-4-221300-2	163	3/2R	PL DATA INTERLEAVER	ERRONEOUS OUTPUT
05-5-B03-7-1	305	3/1R	MDM OF4, OA1, OA2, OA3	ERRONEOUS OUTPUT
NONE	306	2/2	MDM OF3	LOSS OF OUTPUT
NONE	307	2/2	MDM OF3	ERRONEOUS OUTPUT
NONE	308	2/2	MDM OF1, OF2	LOSS OF OUTPUT
NONE	309	2/2	MDM OF1, OF2	ERRONEOUS OUTPUT
05-5-B03-7-2	310	2/2	MDM OA1, OA2, OA3	LOSS OF OUTPUT

APPENDIX E
DETAILED ANALYSIS

This appendix contains the IOA analysis worksheets supplementing previous results reported in STSEOS Working Paper 1.0-WP-VA86001-017, Analysis of the Instrumentation Subsystem (12 December 1986). Prior results were obtained independently and documented before starting the FMEA/CIL assessment activity. Supplemental analysis was performed to address failure modes not previously considered by the IOA. Each sheet identifies the hardware item being analyzed, parent assembly and function performed. For each failure mode possible causes are identified, and hardware and functional criticality for each mission phase are determined as described in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. Failure mode effects are described at the bottom of each sheet and worst case criticality is identified 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: 1/26/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 144 ABORT: 3/3

ITEM: CIRCUIT BREAKER, 5-AMP, PAYLOAD TIMING BUFFER
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OPERATIONAL INSTRUMENTATION
3) PAYLOAD TIMING BUFFER
4) CIRCUIT BREAKER
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: STANDARD SWITCH PANEL
PART NUMBER: MC454-0026-2050

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
CIRCUIT BREAKER PROVIDES POWER AND CIRCUIT PROTECTION FOR THE PAYLOAD TIMING BUFFER. LOSS OF BUFFER FUNCTION BECAUSE OF CIRCUIT BREAKER FAILURE WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: VS70-750139

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: EPD&C/INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 154 ABORT: 3/3

ITEM: CIRCUIT BREAKER, 5-AMP, PAYLOAD TIMING BUFFER
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OPERATIONAL INSTRUMENTATION
3) ORBITAL TIMING BUFFER
4) CIRCUIT BREAKER
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL 016
PART NUMBER: MC454-0026-2030

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
CIRCUIT BREAKER PROVIDES POWER AND CIRCUIT PROTECTION FOR THE ORBITAL TIMING BUFFER. LOSS OF BUFFER FUNCTION BECAUSE OF CIRCUIT BREAKER FAILURE WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: VS70-750139

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 175 ABORT: 3/3

ITEM: EVENT INDICATOR - OPS RECORDER CONTROL MODE
FAILURE MODE: ERRATIC OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), FAILS TO SWITCH, SHORTED

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) OPS RECORDER
4) CONTROL MODE TALKBACK
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL A1
PART NUMBER: MC452-0222-0XXX

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
TALKBACK INDICATES WHETHER OPs RECORDER IS IN COMMAND OR PANEL CONTROL MODE. LOSS OF INDICATION WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: SYSTEM SCHEMATIC VS70-750119

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 176 ABORT: 3/3

ITEM: EVENT INDICATOR, OPS RECORDER OPERATIONAL MODE
FAILURE MODE: ERRATIC OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), FAILS TO SWITCH, SHORTED

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) OPS RECORDER
4) OPERATIONAL MODE TALKBACK
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL A1
PART NUMBER: MC452-0222-0XXX

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
TALKBACK INDICATES WHETHER OPs RECORDER IS IN RECORD MODE; STANDBY, STOP, OR UNPOWERED; OR IN PLAYBACK OR REWIND. LOSS OF INDICATION WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: VS70-750119

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 177 ABORT: 3/3

ITEM: EVENT INDICATOR - ANOMALY SEQUENCE TALKBACK
FAILURE MODE: ERRATIC OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), FAILS TO SWITCH, SHORTED

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) OPS RECORDER
4) ANOMALY SEQUENCE TALKBACK
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL A1
PART NUMBER: MC452-0222-0XXX

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
TALKBACK IS INTENDED TO INDICATE WHETHER OPS RECORDER IS IN ANOMALY SEQUENCE OR NOT. LOSS OF FUNCTION WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: VS70-750119

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 185 ABORT: 3/3

ITEM: EVENT INDICATOR - PAYLOAD RECORDER CONTROL SOURCE
FAILURE MODE: ERRATIC OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), FAILS TO SWITCH, SHORTED

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) PAYLOAD RECORDER
4) RECORDER CONTROL SOURCE TALKBACK
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL A1
PART NUMBER: MC452-0222-0XXX

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
TALKBACK INDICATES WHETHER PAYLOAD RECORDER IS UNDER PANEL OR MDM CONTROL. LOSS OF FUNCTION WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: VS70-750149

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/26/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 186 ABORT: 3/3

ITEM: EVENT INDICATOR - PAYLOAD RECORDER MODE TALKBACK
FAILURE MODE: ERRATIC OPERATION, PHYSICAL BINDING/JAMMING, ERRONEOUS OUTPUT, OPEN (ELECTRICAL), FAILS TO SWITCH, SHORTED

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) PAYLOAD RECORDER
4) RECORDER OPERATIONAL MODE TALKBACK
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL A1
PART NUMBER: MC452-0222-0XXX

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
TALKBACK INDICATES OPERATIONAL MODE OF THE PAYLOAD RECORDER - RECORD MODE; STANDBY, STOP, OR UNPOWERED; OR IN PLAYBACK OR REWIND. LOSS OF FUNCTION WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: VS70-750149

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/3
MDAC ID: 301 ABORT: 3/3

ITEM: VIBRATION MONITORING SYSTEM
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OPERATIONAL INSTRUMENTATION
3) VIBRATION MONITORING SYSTEM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: VARIOUS LOCATIONS
PART NUMBER: MC476-0205-0001

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
THE VIBRATION MONITORING SYSTEM IS USED TO CONDITION TRANSDUCER SIGNALS ROUTED TO MDM's FOR FURTHER PROCESSING. LOSS OF FUNCTION WOULD NOT BE CRITICAL TO MISSION OR TO CREW/VEHICLE.

REFERENCES: VS70-750209

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/27/88 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/2R
MDAC ID: 302 ABORT: 3/2R

ITEM: DSCs OA1, OA2, OA3, OM1
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) DSC
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: OA1 AV BAY 4, OA2 AV BAY 5, OA3 AV BAY 6, OM1 MID FUSELAGE
PART NUMBER: MC476-0131

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

EFFECTS/RATIONALE:
THESE DSCs SUPPLY A VOLTAGE (5 VOLTS DC) TO FLIGHT CRITICAL MDMs FF1, FF3, FF4 VIA THE AUTO/MAN ET SEP SWITCH FOR ET SEPARATION; AND TO THE SAME MDMs VIA THE AUTO-MAN/AUTO SRB SEP SWITCH FOR SRB SEPARATION. LOSS OF ALL SOURCES FOR THAT VOLTAGE AND ALL SEPARATION COMMAND CAPABILITY (KEYBOARD AND GROUND) WOULD BE CATASTROPHIC.

REFERENCES: SCHEMATIC VS70-760502 (ET & SRB SEP SW CKT), SSSH OI DSC/MDM DWG 17.1, IPCL, FSSR STS 83-0010A (LEVEL C GNC RM), INCO/COMM OI BRIEF SB48, STS 83-0026A 4.2.2, 4.2.3

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 2/02/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/2R
MDAC ID: 303 ABORT: 3/3

ITEM: DSC OF3
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) DSC
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AV BAY 3
PART NUMBER: MC476-0131

CAUSES: TEMPERATURE, VIBRATION, CONTAMINATION, LOSS OF INPUT, MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:
CRITICAL AIR REVITALIZATION PRESSURE CONTROL SYSTEM TELEMETRY DATA IS PROCESSED BY DSC OF3 (CABIN DP/DT AND PARTIAL PRESSURE, OXYGEN). THE DP/DT MEASUREMENT IS USED BY C&W FOR KLAXON INPUT. NO REDUNDANT DSC PATH IS PROVIDED. LOSS OF MEASUREMENTS COULD CAUSE LOSS OF MISSION BECAUSE POTENTIALLY CATASTROPHIC FAILURES COULD BE CONCEALED.

REFERENCES: SSSH PRESSURE CONTROL SYSTEM 6.1, IPCL, SSSH OI DSC/MDM DWG 17.1, INCO/COMM OI BRIEF SB48

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/23/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/2R
MDAC ID: 304 ABORT: 3/3

ITEM: DSC OF3
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) DSC
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AV BAY3
PART NUMBER: MC476-0131

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

EFFECTS/RATIONALE:
CRITICAL AIR REVITALIZATION PRESSURE CONTROL SYSTEM TELEMETRY DATA IS PROCESSED BY DSC OF3 (CABIN DP/DT AND PARTIAL PRESSURE, OXYGEN). THE DP/DT MEASUREMENT IS USED BY C&W FOR KLAXON INPUT. NO REDUNDANT PATH IS PROVIDED. ERRONEOUS MEASUREMENTS COULD CAUSE MISSION TERMINATION.

REFERENCES: VS70-974102

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/23/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 3/1R
MDAC ID: 305 ABORT: 3/1R

ITEM: MDM OF4, OA1, OA2, OA3
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) MDM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: OF4 FLT DECK, OA1 AV BAY 4, OA2 AV BAY 5, OA3 AV BAY 6
PART NUMBER: MC615-004-53XX, 6310

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

EFFECTS/RATIONALE:
THESE MDM's PROCESS/ROUTE CRITICAL APU STATUS DATA (FUEL TEST LINE TEMPERATURE AND FUEL PUMP DRAIN LINE TEMPERATURE). AN ERRONEOUS OUTPUT FALSELY INDICATING A HEATER STUCK IN "ON" CONDITION COULD PROMPT MANUAL SHUTDOWN OF AN APU. TWO OF THE THREE APU's ARE REQURIED FOR LANDING; THEREFORE SHUTDOWN OF ONE WOULD REQUIRE ABORT DURING LIFTOFF. AN ERRONEOUS OUTPUT MASKING A HEATER STUCK ON COULD RESULT IN EXPLOSION AND CAUSE LOSS OF CREW/VEHICLE. FAILS SCREEN B BECAUSE FAILED MDM CHANNEL COULD NOT BE DETECTED.

REFERENCES: SSSH OI DSC/MDM DWG. 17.1, INCO/COMM SYS BRIEF SB28, IPCL, VS70-946099

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 2/2
MDAC ID: 306 ABORT: 3/3

ITEM: MDM OF3
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) MDM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AV BAY 3
PART NUMBER: MC615-0004-53XX, 6310

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

EFFECTS/RATIONALE:
FOR PRESENT FUEL CELL SYSTEM MDM OF3 HANDLES ALL FUEL CELL CURRENT MEASUREMENTS AND FC1 SUBSTACK 3, FC2 SUBSTACK 2, AND FC3 SUBSTACK 1 DELTA VOLTAGE MEASUREMENTS. THESE MEARUREMENTS ARE CRITICAL BECAUSE THEIR LOSS COULD CONTROL OXYGEN-HYDROGEN CROSSOVER IN A FUEL CELL WHICH IN TURN COULD CAUSE AN EXPLOSION AND LOSS OF VEHICLE AND CREW IF THE MALFUNCTIONING FUEL CELL WERE NOT SHUT DOWN PROMPTLY. (PRIMARY METHOD OF DETECTING FUEL CELL "HOT SPOTS", AND THEREFORE EXPLOSION HAZARD, IS IF A DELTA VOLTAGE MEASUREMENT RISES RAPIDLY AND GOES OUT OF NORMAL RANGE - ABOVE 150 MV.) NO REDUNDANT PATHS EXIST FOR THESE MEASUREMENTS. THEIR LOSS WOULD CAUSE MISSION TERMINATION.

REFERENCES: SSSH FUEL CELL 3.4, IPCL, SSSH OI DSC/MDM DWG 17.1, INCO/COMM OI BRIEF SB48, SFOM INSTR VOL. 4E, EPS INT SCHEMATICS VS70-945099, VS70-945102

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 2/2
MDAC ID: 307 ABORT: 3/3

ITEM: MDM OF3
FAILURE MODE: ERRONEOUS OUTPUT, PREMATURE OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) MDM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: AV BAY 3
PART NUMBER: MC615-0004-53XX, 6310

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

EFFECTS/RATIONALE:
FOR PRESENT FUEL CELL SYSTEM MDM OF3 HANDLES ALL FUEL CELL CURRENT MEASUREMENTS AND DELTA VOLTAGE MEASUREMENTS FOR FC1 SUBSTACK 3, FC2 SUBSTACK 2, AND FC3 SUBSTACK 1. AN ERRONEOUS OR PREMATURE OUTPUT COULD CAUSE A FALSE INDICATION OF FUEL CELL MALFUNCTION, E.G., A SUDDEN INCREASE IN INDICATED SUBSTACK DELTA VOLTAGE OR CURRENT IMBALANCE AMONG FUEL CELLS. SUCH AN APPARENT MALFUNCTION COULD PROMPT MANUAL FUEL CELL SHUTDOWN WHICH IN TURN COULD REQUIRE MISSION CONSTRAINTS THAT WOULD CAUSE MISSION LOSS.

REFERENCES: SSSH FUEL CELL 3.4, IPCL, SSSH OI DSC/MDM DWG 17.1, INCO/COMM OI BRIEF SB48, SFOM INSTR VOL. 4E, EPS INT SCHEMATICS VS70-945099, VS70-945102

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 2/2
MDAC ID: 308 ABORT: 3/3

ITEM: MDM OF1, OF2
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) MDM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MDM OF1 AV BAY 1, MDM OF2 AV BAY 2
PART NUMBER: MC615-0004-53XX, 6310

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

EFFECTS/RATIONALE:
FOR PRESENT FUEL CELL SYSTEM MDMs OF1 AND OF2 HANDLE FUEL CELL SUBSTACK DELTA VOLTAGE MEASUREMENTS. EACH OF THESE MEASUREMENTS IS CRITICAL AND ITS LOSS COULD CAUSE MISSION TERMINATION BECAUSE THAT LOSS COULD CONCEAL OXYGEN-HYDROGEN CROSSOVER IN A FUDL CELL WHICH IN TURN COULD CAUSE AN EXPLOSION AND LOSS OF VEHICLE AND CREW IF THE MALFUNCTIONING FUEL CELL WERE NOT SHUT DOWN PROMPTLY. NO REDUNDANT PATHS EXIST FOR THESE MEASUREMENTS.

REFERENCES: SSSH FUEL CELL 3.4, IPCL, SSSH OI DSC/MDM DWG 17.1, INCO/COMM OI BRIEF SB48, SFOM INSTR VOL. 4E, EPS INT SCHEMATICS VS70-945099, VS70-954102

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 2/2
MDAC ID: 309 ABORT: 3/3

ITEM: MDM OF1, OF2
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) MDM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MDM OF1 AV BAY 1, MDM OF2 AV BAY 2
PART NUMBER: MC615-0004-53XX, 6310

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

EFFECTS/RATIONALE:
FOR PRESENT FUEL CELL SYSTEM MDMs OF1 AND OF2 HANDLE FUEL CELL SUBSTACK DELTA VOLTAGE MEASUREMENTS. AN ERRONEOUS OR PREMATURE OUTPUT COULD CAUSE A FALSE INDICATION OF FUEL CELL MALFUNCTION, E.G., A SUDDEN INCREASE IN ANY SUBSTACK DELTA VOLTAGE AMONG FUEL CELLS. SUCH AN APPARENT MALFUNCTION COULD PROMPT MANUAL FUEL CELL SHUT DOWN WHICH IN TURN COULD REQUIRE MISSION CONSTRAINTS THAT WOULD RESULT IN MISSION LOSS.

REFERENCES: SSSH FUEL CELL 3.4, IPCL SSSH OI DSC/MDM DWG 17.1, INCO/COMM OI BRIEF SB48, SFOM INSTR VOL. 4E, EPS INT SCHEMATICS VS70-945099, VS70-954102

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: INSTRUMENTATION FLIGHT: 2/2
MDAC ID: 310 ABORT: 3/3

ITEM: MDM OA1, OA2, OA3
FAILURE MODE: LOSS OF OUTPUT, OPEN, SHORTED

LEAD ANALYST: A.W. ADDIS SUBSYS LEAD: K. SCHMECKPEPER

BREAKDOWN HIERARCHY:
1) INSTRUMENTATION
2) OI
3) MDM
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: MDM OA1 AV BAY 4, MDM OA2 AV BAY 5, MDM OA3 AV BAY 6
PART NUMBER: MC615-0004-53XX, 6410

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

EFFECTS/RATIONALE:
CRITICAL APU MEASUREMENTS OF FUEL LINE TEMPATURE, FUEL PUMP OUTPUT TEMPATURE, AND BYPASS LINE TEMPERATURE FOR THE THREE APUs ARE PROCESSED BY MDMs OA1, OA2, AND OA3. REDUNDANT PAIRS OF MEASUREMENTS ARE NOT ROUTED VIA SEPARATE MDM PATHS FOR THESE MEASUREMENTS. THEIR LOSS WOULD CAUSE LOSS OF INSIGHT INTO APU OPERATION, WHICH COULD CAUSE MISSION ABORT, OR COULD CONCEAL MALFUNCTIONS THAT COULD CAUSE LOSS OF CREW/VEHICLE.

REFERENCES: SSSH OI DSC/MDM DWG 17.1, INCO/COMM OI BRIEF SB28, INSTRUMENTATION PROGRAM AND COMPONENT LIST (IPCL)

APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE/RECOMMENDATIONS

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.

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS

IDENTIFIERS		NASA				IOA RECOMMENDATIONS *					
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A	B	C	CRIT HW/F	SCREENS A	B	C	OTHER (SEE LEGEND CODE)	ISSUE
	EPDC/INSTR-271	3/3				/					
	INSTR-102	/				3/2R	P	P	P		X
	INSTR-104	/				3/2R	P	P	P		X
	INSTR-105	/				3/2R	P	P	P		X
	INSTR-112	/				3/2R	P	P	P		
05-4-220200-1	INSTR-101	3/3				/					
	INSTR-103	3/3				/					
	INSTR-106	3/3				/					
05-4-220202-1	INSTR-302X	3/1R	P	P	P	/					
05-4-220300-1	INSTR-201	3/3				/					
05-4-220400-1	INSTR-121	2/1R	P	P	P	/		NA			X
05-4-220400-2	INSTR-122	2/1R	P	P	P	/		NA			X
	INSTR-123	2/1R	P	P	P	/		NA			X
05-4-220402-1	INSTR-124	2/2				/					
	INSTR-125	2/2				/					
	INSTR-126	2/2				/					
05-4-220500-1	INSTR-301X	3/3				/					
05-4-220600-1	INSTR-221	3/3				/					
05-4-220700-1	INSTR-218	3/3				/					
05-4-221000-1	INSTR-171	3/3				/					
05-4-221001-1	INSTR-172	3/3				/					
05-4-221002-1	INSTR-174	3/3				/					
05-4-221003-1	INSTR-173	3/3				/					
05-4-221004-1	INSTR-175X	3/3				/					
	INSTR-176X	3/3				/					
	INSTR-177X	3/3				/					
05-4-221100-1	INSTR-181	3/3				3/2R	P	P	P		X
05-4-221101-1	INSTR-183	3/3				3/2R	P	P	P		X
05-4-221102-1	INSTR-184	3/3				3/2R	P	P	P		X
05-4-221103-1	INSTR-182	3/3				3/2R	P	P	P		X
05-4-221104-1	INSTR-185X	3/3				/					
	INSTR-186X	3/3				/					
05-4-221300-1	INSTR-161	2/2				/					
	INSTR-162	2/2				/					
05-4-221300-2	INSTR-163	2/2			X	/					
05-4-221400-1	INSTR-141	3/3				/					
05-4-221400-2	INSTR-142	3/3				/					
	INSTR-143	3/3				/					
05-4-221401-1	EPDC/INSTR-144X	3/3				/					
05-4-221500-1	INSTR-151	3/3				/					
05-4-221500-2	INSTR-152	3/3				/					
	INSTR-153	3/3				/					
05-4-221501-1	EPDC/INSTR-154X	3/3				/					
05-4-22400-1	INSTR-264	3/3				/					
05-4-230100-1	INSTR-212	3/3				/					

IDENTIFIERS		NASA				IOA RECOMMENDATIONS ↕				
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A	B	C	CRIT HW/F	SCREENS A	B	C	OTHER (SEE LEGEND CODE)	ISSUE
05-4-230400-1	INSTR-231	3/3				/					
05-4-230401-1	INSTR-232	3/3				/					
05-4-230402-1	INSTR-233	3/3				/					
05-4-230500-1	INSTR-261	3/3				/					
	INSTR-262	3/3				/					
05-4-230601-1, -2306	INSTR-222	3/3				/					
05-4-230800-1	INSTR-251	3/3				/					
	INSTR-252	3/3				/					
	INSTR-253	3/3				/					
05-4-230802-1	INSTR-254	3/3				/					
	INSTR-255	3/3				/					
05-4-232200-1	INSTR-265	3/3				/					
05-4-236100-1	INSTR-263	3/3				/					
05-4-236200-1	INSTR-270	3/3				/					
05-4-236300-1	INSTR-269	3/3				/					
05-4-236400-1	INSTR-268	3/3				/					
05-4-236700-1	INSTR-267	3/3				/					
05-4-237300-1	INSTR-266	3/3				/					
05-4-238000-1	INSTR-241	3/3				/					
05-4-321200-1	INSTR-131	2/1R	P	P	F	2/2					X
05-4-321200-2	INSTR-132	2/1R	P	P	F	2/2					X
	INSTR-133	2/1R	P	P	F	2/2					X
05-5-B03-6-1	INSTR-114	3/2R	P	P	P	/					
05-5-B03-7-1	INSTR-113	2/1R	P	P	P	/					
	INSTR-115	2/1R	P	F	P	/		F			
	INSTR-305X	2/2	P	F	P	3/1R	P	F	P		X
05-5-B03-7-2	INSTR-310X	2/2	P	F	P	/					
05-6R-213400-1	EPDC/INSTR-274	3/3				/					
05-6R-213401-1	EPDC/INSTR-275	3/3				/					
05-6R-213500-1	EPDC/INSTR-273	3/3				/					
05-6R-213501-1	EPDC/INSTR-272	3/3				/					
05-6R-220201-1	EPDC/INSTR-108	3/3	P	P	P	3/1R	P	P	P		X
05-6R-220202-1	EPDC/INSTR-111	3/3				/					
05-6R-220203-1	EPDC/INSTR-110	3/3				/					
05-6R-220204-1	EPDC/INSTR-106	3/3	P	P	P	3/2R	P	P	P		X
05-6R-220205-1	EPDC/INSTR-109	3/3	NA	NA	NA	3/1R	P	P	P		X
05-6R-220206-1	EPDC/INSTR-107	3/3	NA	NA	NA	3/2R	P	P	P		X
05-6R-220401-1	EPDC/INSTR-127	3/2R	P	P	P	/					
05-6R-220402-1	EPDC/INSTR-128	2/1R	P	P	P	/					
05-6R-221001-1	EPDC/INSTR-176	3/3				/					
	EPDC/INSTR-177	/				/					
05-6R-221101-1	EPDC/INSTR-185	3/3				3/2R	P	P	P		X
05-6R-221201-1	EPDC/INSTR-134	3/1R	P	P	P	3/2R					X
05-6R-221301-1	EPDC/INSTR-164	3/3				3/2R	P	P	P		X
05-6R-221501-1	EPDC/INSTR-117	3/2R	P	P	P	3/1R	P	F	P		X
05-6R-221502-1	EPDC/INSTR-115	3/2R	P	P	P	/					
05-6R-221503-1	EPDC/INSTR-116	3/2R	P	P	P	/					
05-6R-221504-1	EPDC/INSTR-118	2/2				2/1R	P	F	P		X
05-6R-230601-1	EPDC/INSTR-243	3/3				/					
05-6R-230801-1	EPDC/INSTR-256	3/3				/					

IDENTIFIERS		NASA				IOA RECOMMENDATIONS *				
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A	B	C	CRIT HW/F	SCREENS A	B	C	OTHER (SEE LEGEND CODE)	ISSUE
05-6R-238001-1	EPDC/INSTR-242	3/3				/					
05-6R-238500-1	EPDC/INSTR-203	3/3				/					
05-6R-238501-1	EPDC/INSTR-202	3/3				/					
	INSTR-211	3/3				/					
05-6R-238502-1	EPDC/INSTR-214	3/3				/					
	INSTR-213	3/3				/					
NONE	INSTR-303X	/				3/2R	P	P	P		X
	INSTR-304X	/				3/2R	P	P	P		X
	INSTR-306X	/				2/2					X
	INSTR-307X	/				2/2					X
	INSTR-308X	/				2/2					X
	INSTR-309X	/				2/2					X