INDEPENDENT ORBITER ASSESSMENT

ANALYSIS
OF THE
ORBITER
EXPERIMENTS

21 AUGUST 1987

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

WORKING PAPER NO. 1.0-WP-VA87001-07

INDEPENDENT ORBITER ASSESSMENT ANALYSIS OF THE ORBITER EXPERIMENT (OEX) SUBSYSTEM

21 August 1987

This Working Paper is Submitted to NASA under
Task Order No. VA87005, Contract NAS 9-17650

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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. The IOA approach features a top-down analysis of the hardware to determine failure modes, criticality, and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. This report documents (Appendix C) the independent analysis results corresponding to the Orbiter Experiments hardware.

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

The Orbiter Experiments (OEX) Program consists of a multiple set of experiments for the purpose of gathering environmental and aerodynamic data to develop more accurate ground models for Shuttle performance and to facilitate the design of future spacecraft. Several experiments have already flown and are not scheduled to fly again. Others are still in development stages and have not been manifested for a mission. This assessment will only address currently manifested experiments and their support systems. Specifically this list consists of:

- Shuttle Entry Air Data System (SEADS)
- Shuttle Upper Atmosphere Mass Spectrometer (SUMS)
- Forward Fuselage Support System for OEX (FFSSO)
- Shuttle Infrared Laced Temperature Sensor (SILTS)
- Aerodynamic Coefficient Identification Package (ACIP)
- Support System for OEX (SSO)

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

Summary of IOA Failure Modes By Criticality (HW/F)							
Criticality :	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number :	2	-	-	-	-	80	82

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

Summary of IOA Potential Critical Items (HW/F)						
Criticality :	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
Number :	2	-	-	-	-	2

There are only two potential critical items for the OEX, since the experiments only gather data for analysis post mission and are totally independent systems except for power. Failure of any experiment component usually only causes a loss of experiment data and in no way jeopardizes the crew or mission, resulting the large number of 3/3 assessments.

ORBITER EXPERIMENTS ANALYSIS SUMMARY OVERVIEW

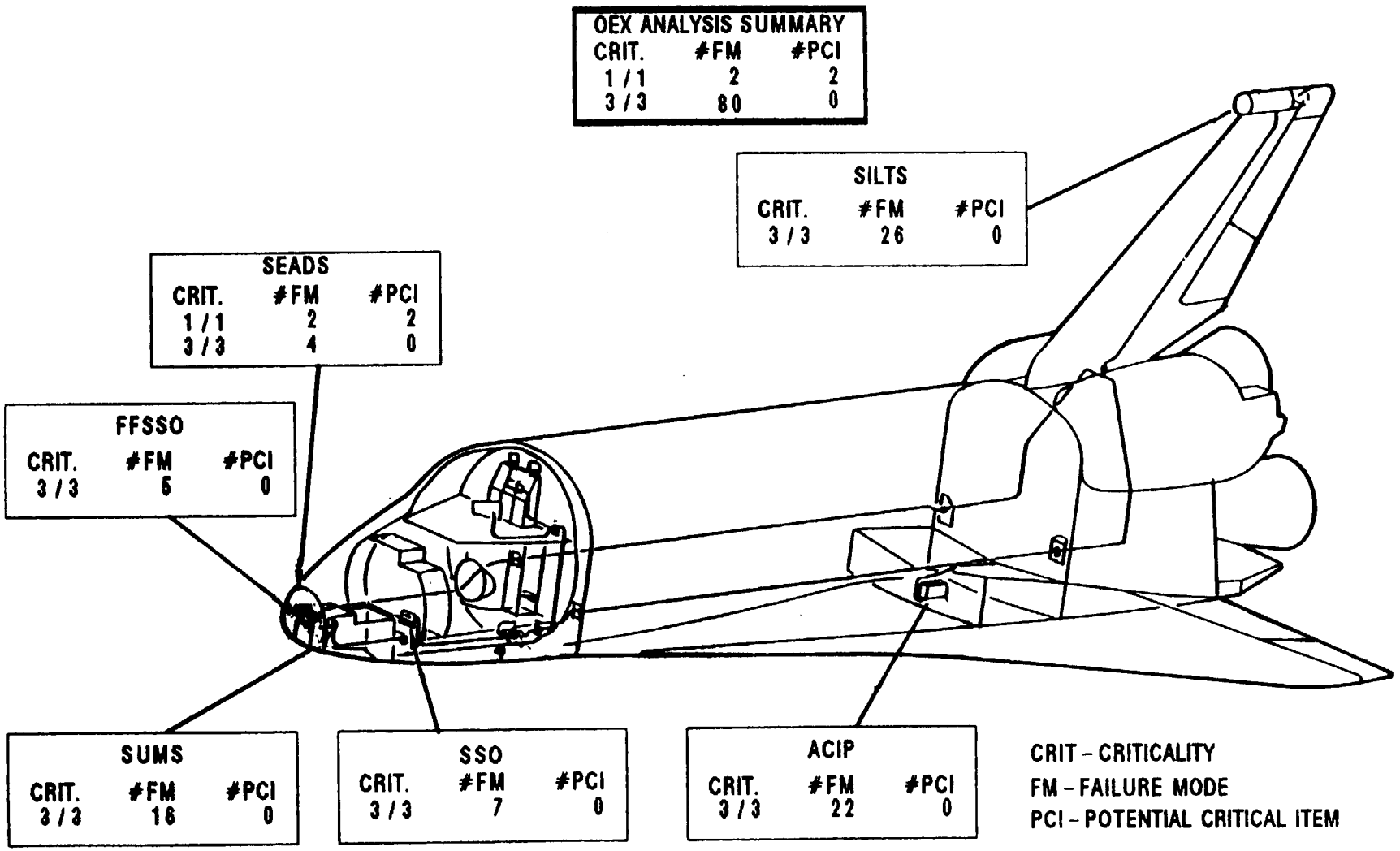

Figure 1 - OEX ANALYSIS SUMMARY OVERVIEW

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 OEX Ground Rules and Assumptions

The OEX ground rules and assumptions used in the IOA are defined in Appendix B. The experiments specific groundrules were defined to limit the analysis to single failed parts for each failure.

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The Orbiter experiments (OEX) consists of various sets of hardware required to obtain precise data for physics, aerodynamics, thermodynamics, structures, and materials on the orbiter in a flight and orbital environment. Data for the OEX may be from existing sensors in the operational instrumentation (OI), from sensors in the development flight instrumentation (DFI), from new OEX unique sensors, or from combinations of the above. Data recording of the OEX data is provided by the payload recorder, operations recorder, DFI recorder, OEX recorder, the MADS recorder, or combinations thereof. Columbia, OV-102, is the main test-bed for the OEX. Special unique structural interfaces are required for SEADS, SUMS and SILTS, and thus these experiments are only on OV-102. The ACIP experiment can be fitted to any orbiter.

The Orbiter Experiments consists of the following experiments and support systems:

1. Shuttle Entry Air Data System (SEADS) experiment is designed to reference air data (angle of attack, and angle of sideslip) during the entire free-stream, dynamic pressure, atmospheric flight envelope of the orbiter (Entry). Both air pressure and temperature measurements are made to determine temperature compensation of the pressure measurements. The system comprises of 28 pressure transducers (0- to 5- volt outputs), eight temperature sensors (RTD's) which require signal conditioning, and six radiometers which also require signal conditioning; all located on the nose cone of the orbiter (Figure 2). 14 pressure ports, each containing two pressure transducers, are flush-mounted orifices arranged in a cruciform pattern. The pressure distribution obtained from these ports are used to measure dynamic pressure, vehicle attitude, and state.

2. The Shuttle Upper Atmosphere Mass Spectrometer (SUMS) measures the density and composition of the Earth atmosphere beginning approximately 1 hour prior to orbiter reentry and continues down to an external inlet pressure of 5.18 torr (about 115K Feet). It will provide total atmosphere quantities in regions below that traversed by Earth satellites and above that regularly assessed by ground launched meterological missions. The SUMS experiment is made up of a gas inlet system and a pressurized enclosure containing a mass spectrometer and electronic control system. Data is fed to a PCM-slave which processes and converts it into a format that can be transmitted to the PCM master then to the recorder. The SUMS and PCM-slave are mounted on the bulkhead at the forward end of the orbiter nose landing gear wheel well with the inlet system fitted to the lower fuselage surface in front of the nose wheel well (Figure 3).

3. Part of the Forward Fuselage Support System for Orbiter Experiments (FFSSO) provides for the collection and handling of experiment data (SEADS and SUMS), while the other part provides sensors for the measurement of static air pressure. Six static pressure ports located on the forward fuselage contain two pressure transducers each used to remove the effects of dynamic pressure (from SEADS) as functions of angle of attack and yaw. In addition, there are six temperature measurements, one for each pair of pressure transducers, for temperature compensation of the measured pressures. There is also one temperature sensor on the PCM slave to verify its health. Data is fed to the PCM slave in the nose wheel well, to the PCM master, and then to the recorder. The FFSSO consists also of all the electrical cabling between transducers, sensors, PCM slave and PCM master (Figure 4).

4. Shuttle Infrared Leeside Temperature Sensor (SILTS) experiment is used to obtain high-resolution temperatures of the orbiter upper (leeside) surfaces during entry aerodynamic flight. An infrared (IR) camera, mounted in a pod on top of the vertical fin, is used to produce thermal maps on the orbiter upper surface. These data will improve orbiter operational capability through reduction of the upper thermal protection system (TPS) which will reduce weight and refurbishment costs. Experiment equipment mounted within the pod includes pressure system module, data and control (D&C) module, dome assembly/IR camera, and window protection plugs (Figure 5). The pressure system (GN2) provides coolant for the windows and IR camera and also provides pressure for window plug release. The IR camera alternately views the forward fuselage, black body, and port wing during a 7-second cycle, controlled by camera pointing circuitry in the D&C module. The D&C module also provides an output data interface between the IR camera and the OEX recorder via the ICM/SCM. Heaters in the pod are activated by the crew after launch to regulate the pod temperature between 60 and 80 degrees F throughout the mission. During the entry switch configuration, the crew will enable the experiment switches so that it will receive a start command at entry interface (EI).

5. The Aerodynamic Coefficient Identification Package (ACIP) is to collect and measure the accelerations (linear in X, Y, and Z and angular in roll, pitch and yaw) and rates (roll, pitch, and yaw) of the orbiter. The aerodynamic forces cause the vehicle to slow down from orbital velocity to landing speed during reentry. The data collected by ACIP is of greater resolution than the standard orbiter onboard instrumentation. The ACIP hardware, mounted in a self-contained package, consists of a Triaxial Accelerometer/Gyro Instrument Package (TAGIP), Triaxial Angular Accelerometer (TAA), Triaxial Vibration Sensor

(TVS), Data-Handling Electronics (DHE), and Mini Data-Handling Electronics (MDHE). The package is located beneath the payload bay insulation liner near the longitudinal center of gravity (Figure 6). The High-Resolution Accelerometer Package (HIRAP) was added as a separate major subassembly. It provides a third set of triaxial accelerometer sensors to complement the TAGIP and TAA. Other ACIP associated equipment are the Pulse Code Modulation (PCM) Master and a PCM slave. The PCM master handles data from SEADS, SUMS and FFSSO as well as ACIP. The PCM slave handles the analog data from ACIP to the PCM master (Figure 7). Data from these experiments is then routed to the ICM/SCM then to the OEX recorder. Heaters are installed on the package to maintain temperature greater than 45±5 degrees F during orbital flight. Minimal crew participation is required, since the experiment operations is performed by commands from the ground. Operation is required during ascent, entry and specific orbital tests.

6. The objective of the Support System for Orbiter Experiments (SSO) is to provide control, conditioning, handling and recording of the experiments data. The SSO consists of the OEX Recorder, a control module [either the interface control module (ICM) or the system control module (SCM)], and the wiring and cabling. The equipment is located in the crew compartment Volume D. As a result, the SSO is removed on a Spacelab mission, since it requires this space. The control module is the primary interface between the OEX recorder and experiment instruments, and the orbiter (Figure 8). It controls the OEX recorder speed, record mode, and track selection along with experiment power and mode. It is controlled via uplink commands except for power and it has no telemetry. The OEX recorder records all the OEX experiments data and can only be accessed post-mission through ground support equipment.

3.2 Interfaces and Location

The Orbiter Experiments hardware, for this analysis, consists of four experiments and two support systems. The interfaces for the OEX are relatively simple in that there is a limited number of interfaces with subsystems on the orbiter. Most experiments are controlled via uplink command through the Communications System then through the Data Processing System (DPS) to the experiment. Timing functions are fed into PCMs for comparison and update to internal time. Control surface measurements are input into the ACIP experiment for comparison of their movement to the sensed aerodynamics of the orbiter. Lastly, a few switches are available on panel A7 for manual control of some of the experiments. The location of each of the experiments, support systems, and controls is shown in Figure 9.

3.3 Hierarchy

Figure 10 illustrates the hierarchy of the OEX experiments and the corresponding subcomponents. Figures 2 through 8 comprise the detailed system representation.

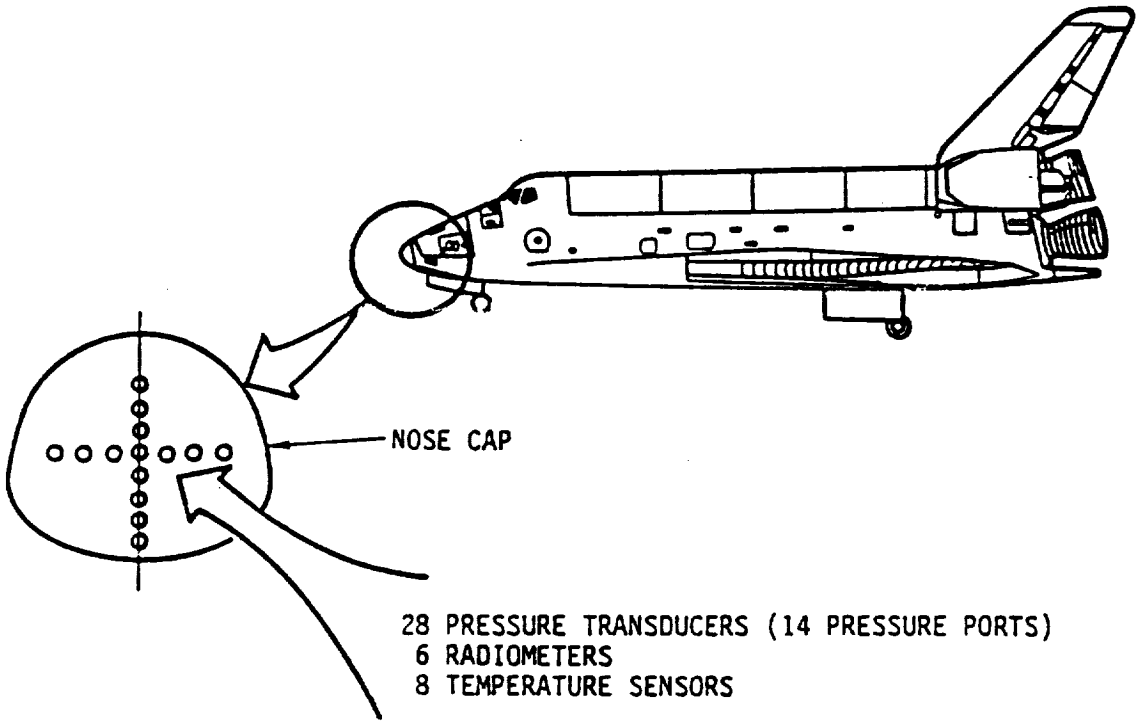

Figure 2 - SEADS HARDWARE

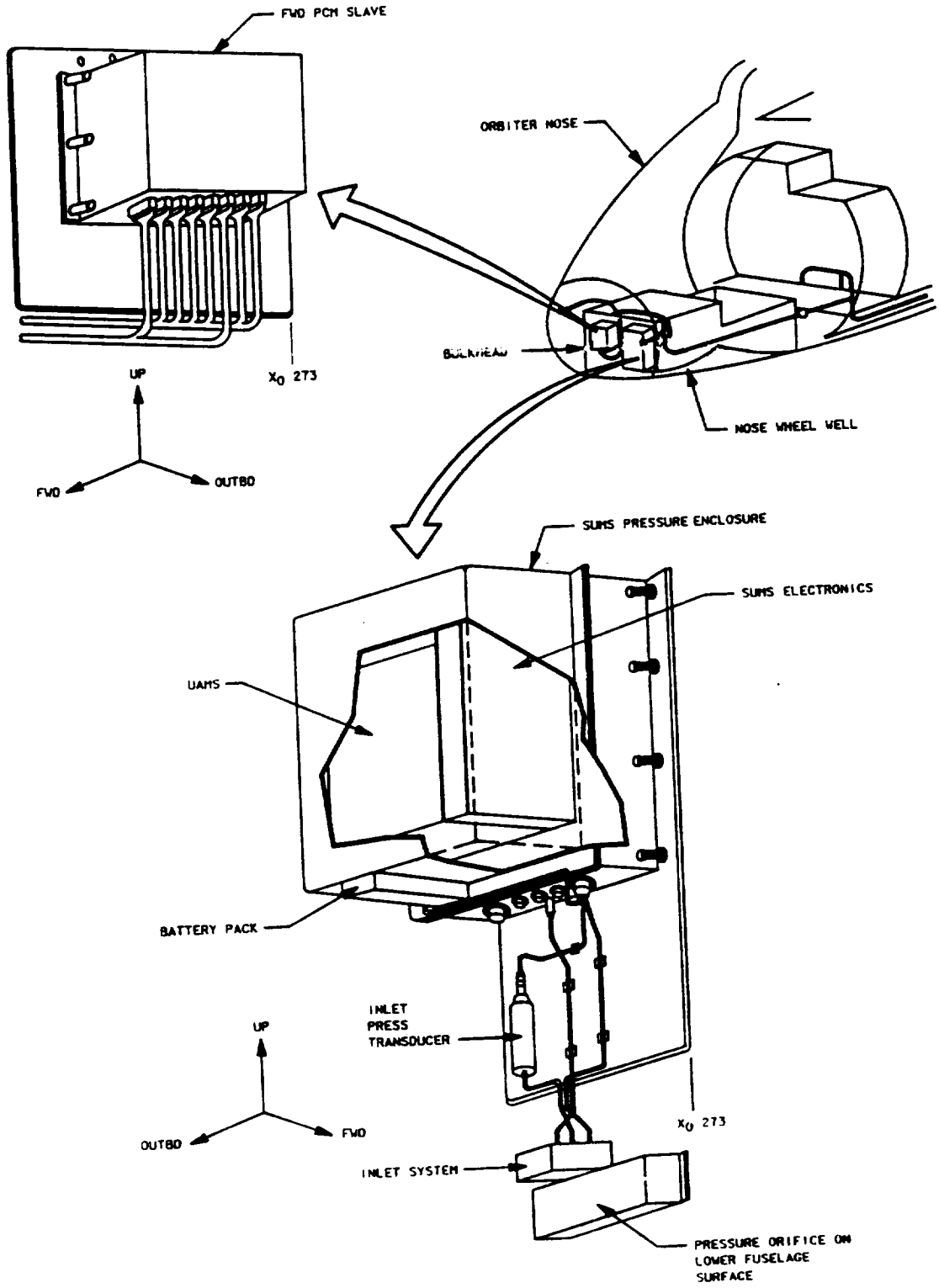

Figure 3 - SUMS HARDWARE LOCATION

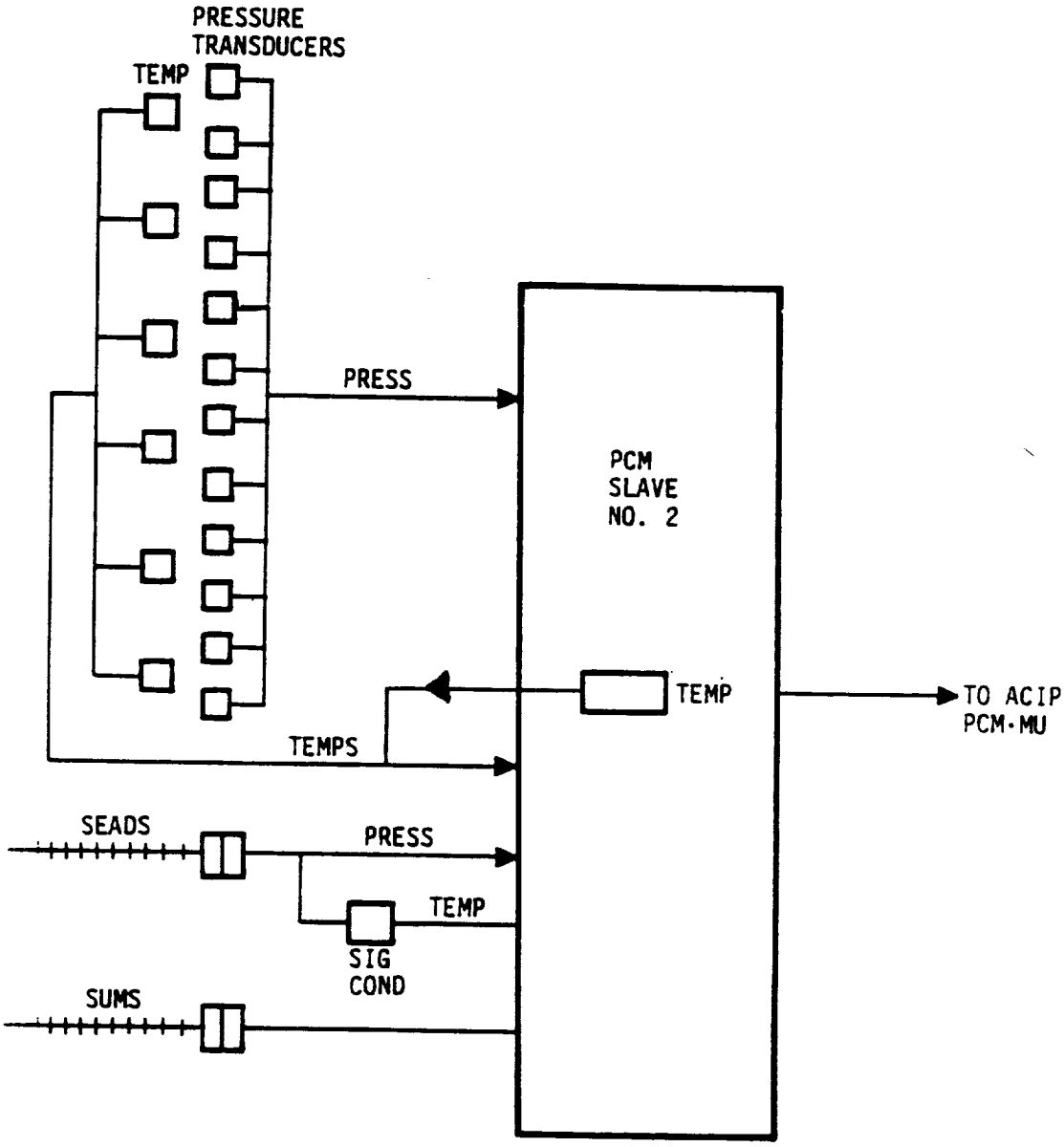

Figure 4 - FFSSO BLOCK DIAGRAM

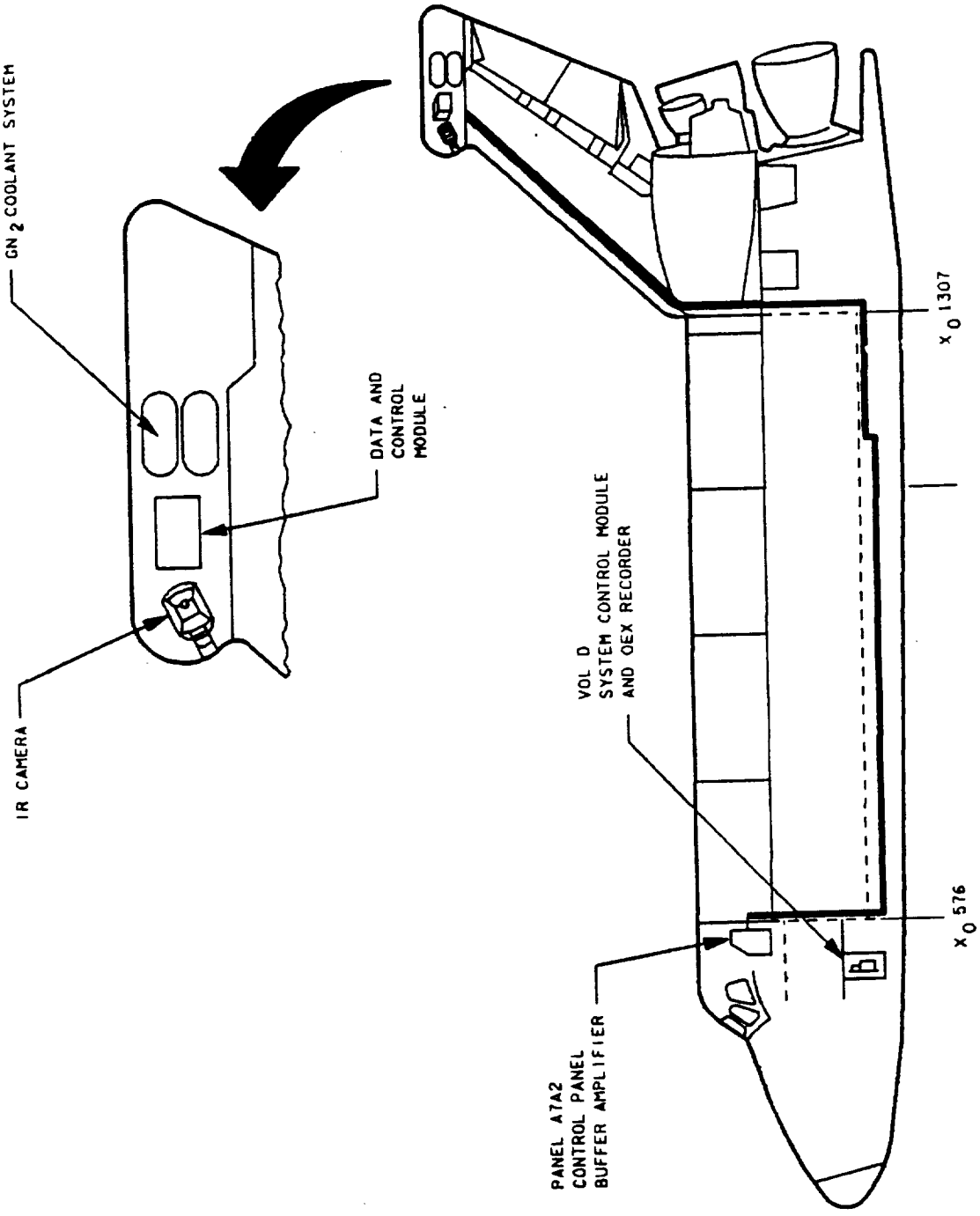

Figure 5 - SILTS EXPERIMENT AND SUPPORT HARDWARE

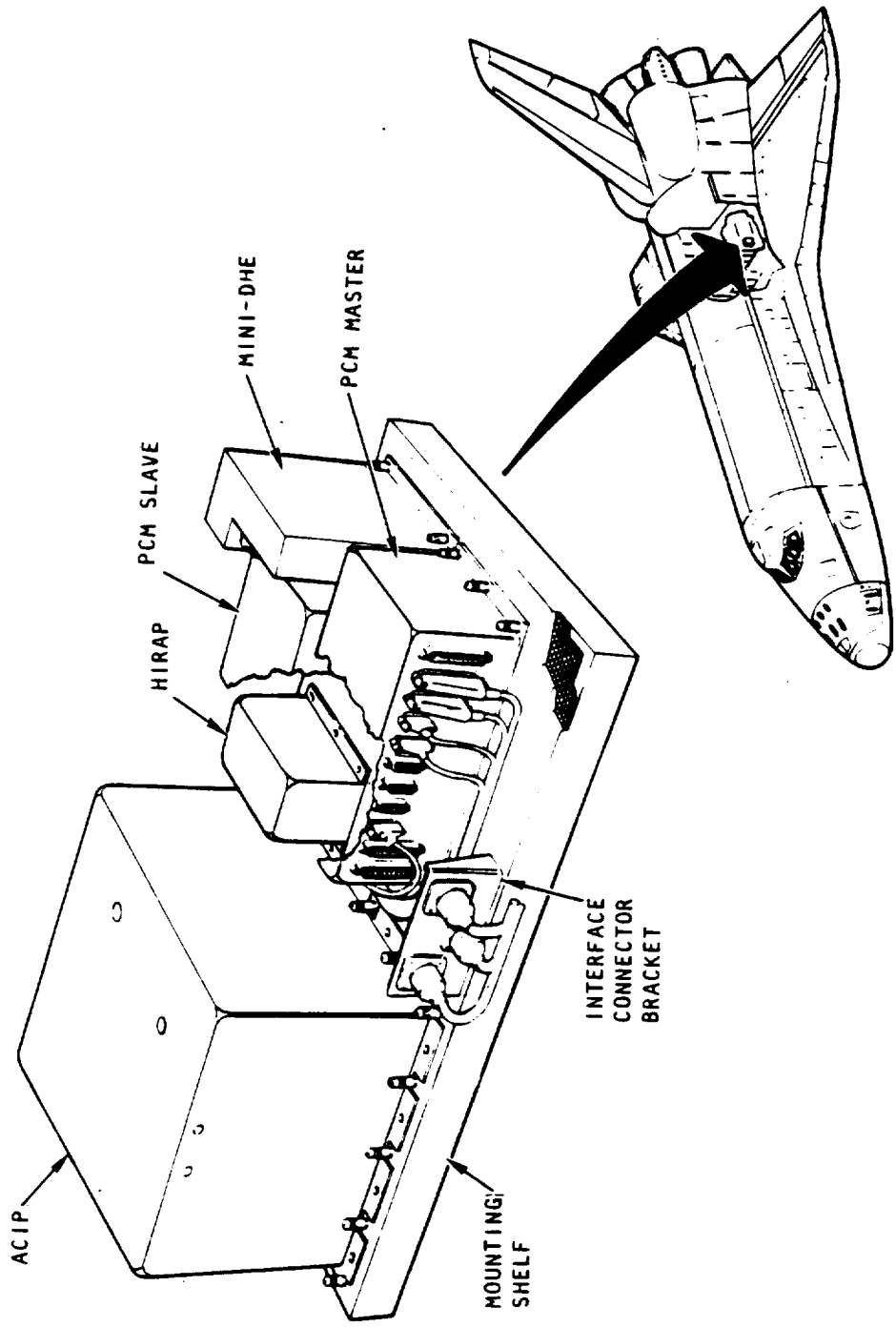

Figure 6 - ACIP EXPERIMENT

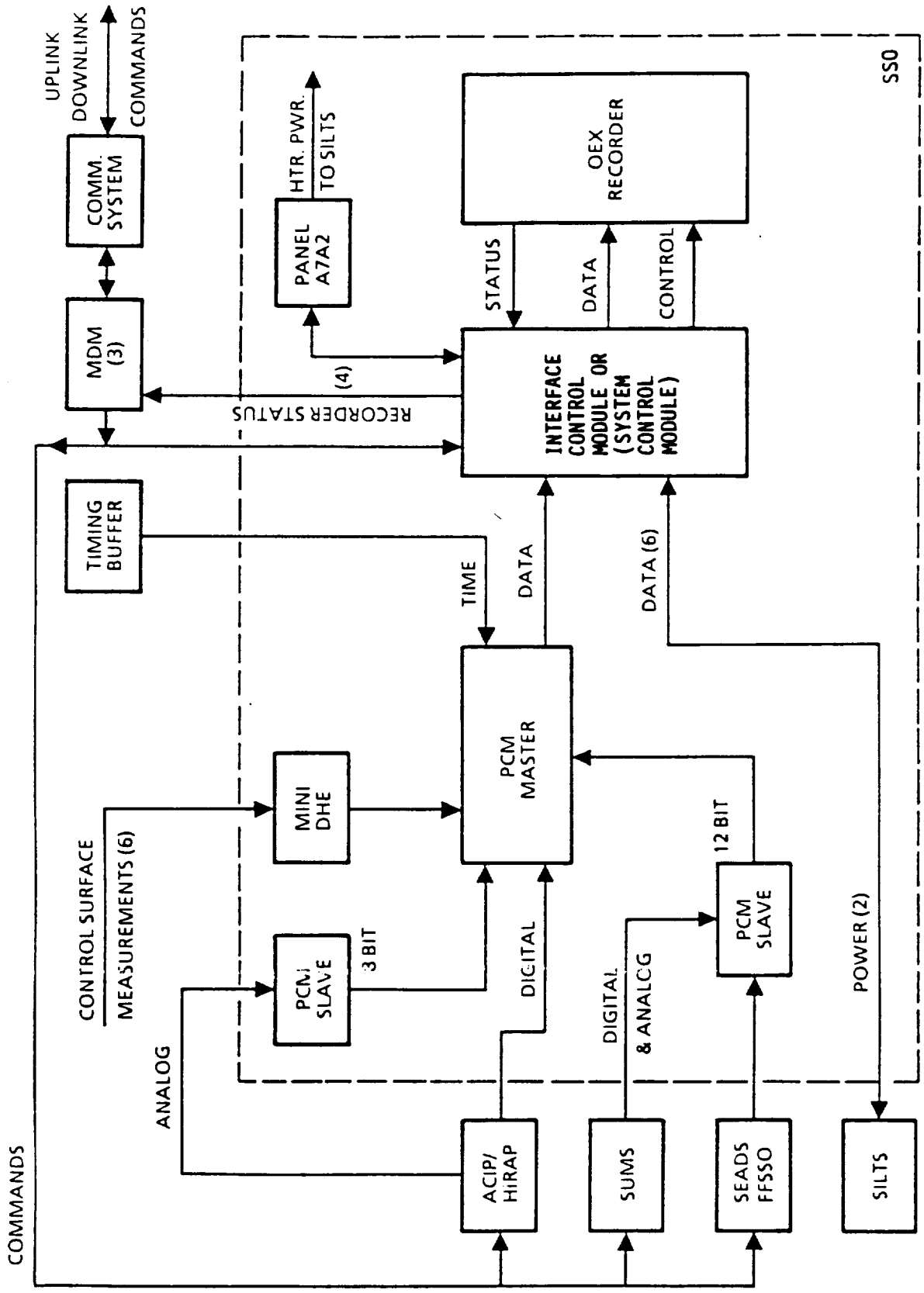

Figure 7 - OEX DATA FLOW SUMMARY

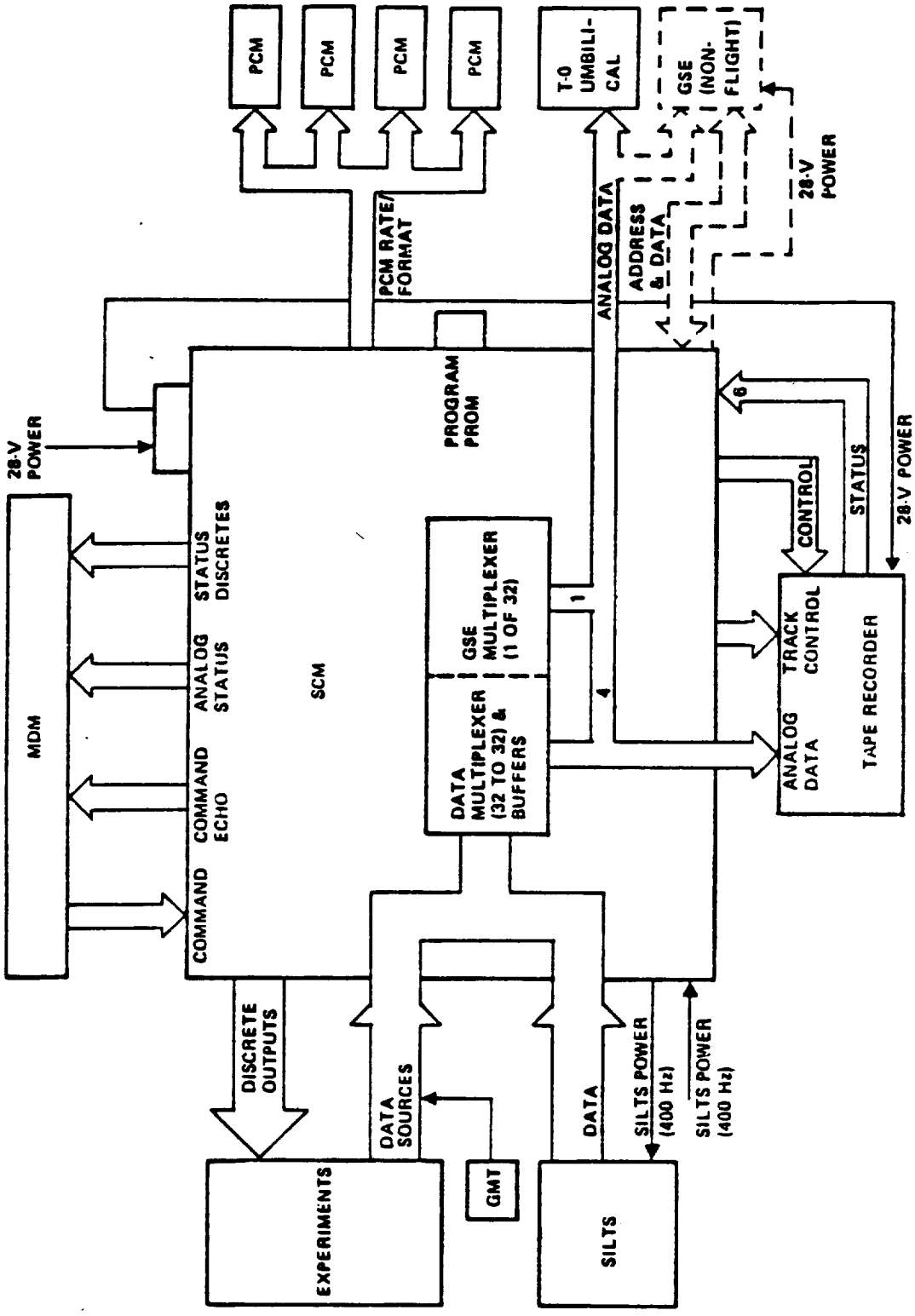

Figure 8 - OEX SCM SYSTEM CONFIGURATION

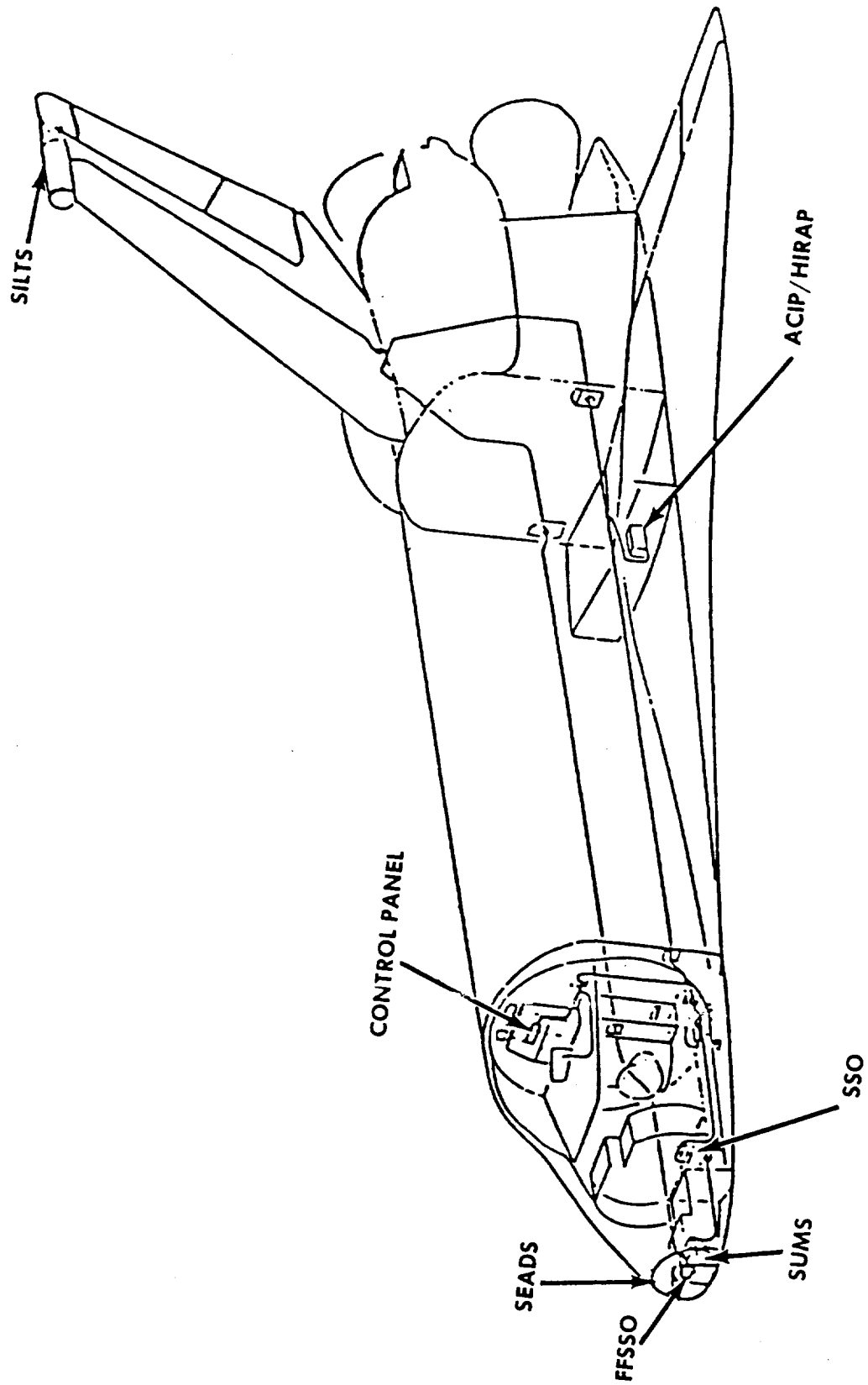

Figure 9 - OEX COMPLEMENT AS OF APRIL 1987

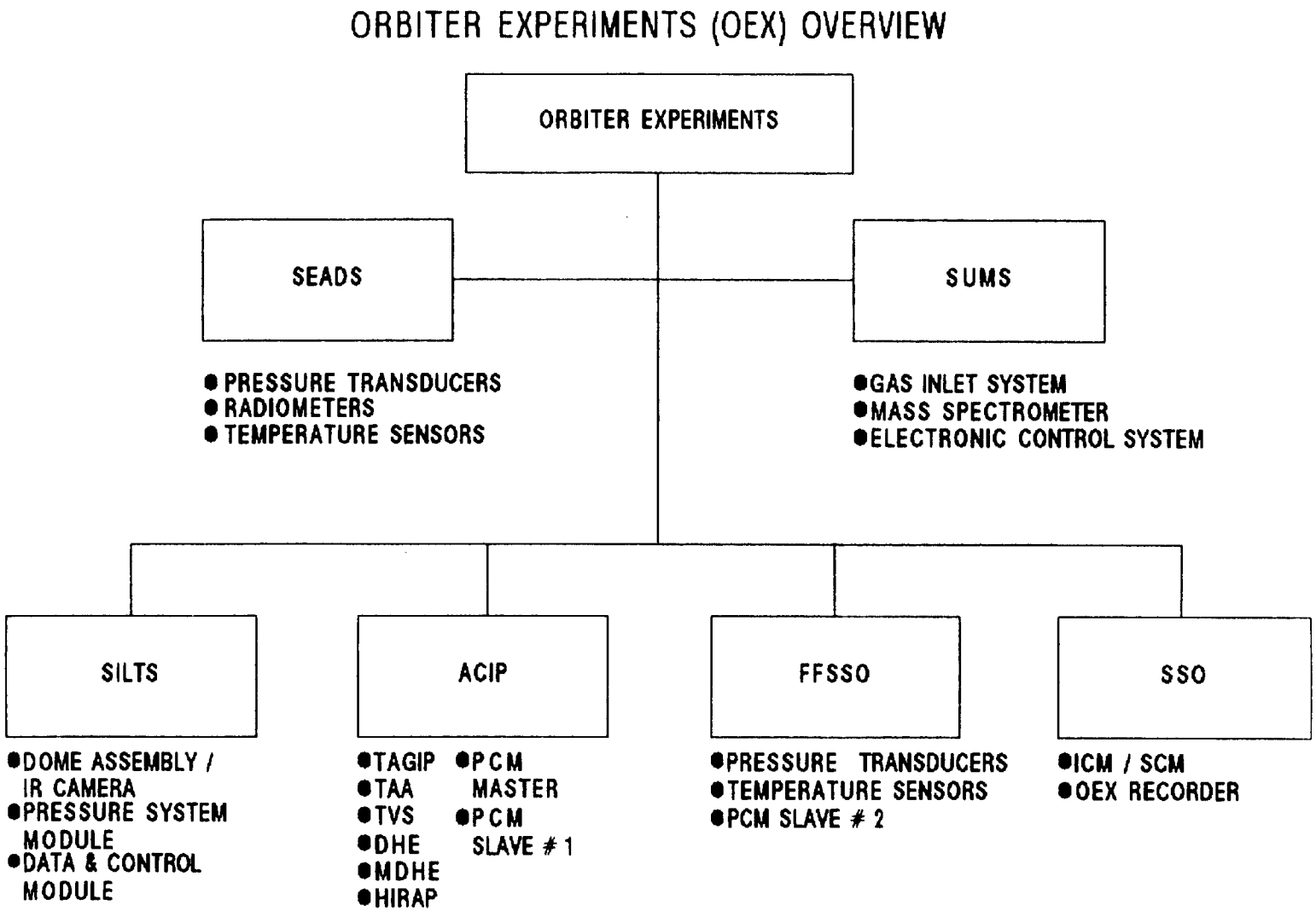

Figure 10 - ORBITER EXPERIMENTS OVERVIEW

4.0 ANALYSIS RESULTS

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

TABLE I Summary of IOA Failure Modes and Criticalities

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
SEADS	2					4	6
SUMS						16	16
FFSSO						5	5
SILTS						26	26
ACIP						22	22
SSO						7	7
TOTAL	2					80	82

Of the 83 failure modes analyzed, 2 failures were determined to result in loss of crew or vehicle, and none were determined to result in loss of mission. A summary of the potential critical items is presented in Table II. Appendix D presents a cross reference between each potential critical item (PCI) and a specific worksheet in Appendix C.

TABLE II Summary of IOA Potential Critical Items

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
SEADS:	2					2

4.1 Analysis Results - SEADS

The SEADS experiment consists of pressure transducers, radiometers, and temperature sensors located in the nose cone of the orbiter. Two CIL's and two PCIs were identified and listed in Appendix D.

4.2 Analysis Results - SUMS

The SUMS experiment consists of a gas inlet system, a mass spectrometer, and an electronic control system. No CILs nor PCIs were identified on this experiment.

4.3 Analysis Results - FFSSO

The FFSSO consists of pressure transducers, temperature sensor, and a PCM slave #2 unit. No CILs nor PCIs were identified on this support system.

4.4 Analysis Results - SILTS

The SILTS experiment consists of a dome assembly/IR camera, a pressure system module, and a data & control module. No CILs nor PCIs were identified on this experiment.

4.5 Analysis Results - ACIP

The ACIP experiment consists of several acrodynamic monitoring pieces of equipment (TAGIP, TAA, TVS, DHE, MDHE, and HIRAP). In addition, other support equipment consists of a PCM Master and a PCM Slave. No CILs nor PCIs were identified on this experiment.

4.6 Analysis Results - SSO

The SSO consists of an ICM/SCM and an OEX recorder. No CILs nor PCIs were identified on this support system.

5.0 REFERENCES

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

1. STS 83-0546A, Space Shuttle Orbiter Experiments Integrated Systems Document, December 1985

2. JSC-19345, Cargo Systems Manual: OEX, STS-ALL, Basic, Rev A, October 25, 1985

3. ICD-3-0049-04, Orbiter Experiment (OEX) System Control Module Interfaces, June 8, 1982

4. V565-763200, OEX Interface Control Module-Assembly, Rev C, December 10, 1981

5. ICD-3-0048-02, Shuttle Infrared Leeside Temperature Sensing (SILTS)/Experiment Interface, January 29, 1979

6. V570-760472, Schematic Diagram ACIP Experiment System, Rev. B, January 22, 1987

7. V570-760462, Schematic Diagram ACIP Experiment System, Rev. C, December 16, 1986

8. ICD-3-0048-09, Aerodynamic Coefficient Identification Package, OV-102 Interface, Physical-Electrical, November 30, 1978

9. V581-000002, OEX Recorder - General Assembly, Basic, April 20, 1979

10. V565-707001, Equipment Installation - Fin Tip Pod (SILTS), Basic, January 24, 1980

11. V570-760422, ACIP Experiment System, Basic, December 1985.

APPENDIX A
ACRONYMS

ACIP	- Aerodynamic Coefficient Instrumentation Package
CIL	- Critical Items List
CMD	- Command, Commander
COMM	- Communications
CRIT	- Criticality
D&C	- Displays and Controls
DCM	- Display and Control Module
DFI	- Development Flight Instrumentation
DHE	- Data-Handling Electronics
DPS	- Data Processing System (Subsystem)
EI	- Entry Interface
F	- Fahrenheit
F	- Functional
FFSSO	- Forward Fuselage Support System for OEX
FLCA	- Forward Load Control Assembly
FMEA	- Failure Modes and Effects Analysis
ft	- Feet
FWD	- Forward
GFE	- Government Furnished Equipment
GMT	- Greenwich Mean Time
GN2	- Gaseous Nitrogen
GSE	- Ground Support Equipment
HIRAP	- High-Resolution Accelerometer Package
HTR	- Heater
HW	- Hardware
ICM	- Interface Control Module
IOA	- Independent Orbiter Assessment
IR	- Infrared
JSC	- Johnson Space Center
MADS	- Modular Auxiliary Data System
MDAC	- McDonnell Douglas Astronautics Company
MDHE	- Mini Data-Handling Electronics
MDM	- Multiplexer/Demultiplexer
N2	- Nitrogen
NASA	- National Aeronautics and Space Administration
NSTS	- National Space Transportation System
OEX	- Orbiter Experiments
OI	- Operational Instrumentation
OPS	- Operations Sequence
PCI	- Potential Critical Item
PCM	- Pulse Code Modulation
PCMMU	- Pulse Code Modulation Master Unit
PWR	- Power
RCDR	- Recorder
RTD	- Resistance Temperature Device
SCM	- System Control Module
SEADS	- Shuttle Entry Air Data System

ACRONYMS

SILTS	- Shuttle Infrared Leeside Temperature Sensor
SSO	- Support System for OEX
STS	- Space Transportation System
SUMS	- Shuttle Upper Atmosphere Mass Spectrometer
TAA	- Triaxial Angular Accelerometer
TAGIP	- Triaxial Accelerometer/Gyro Instrument Package
TPS	- Thermal Protection System
TVS	- Triaxial Vibration Sensor

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 OEX-Specific Ground Rules and Assumptions

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

1. Experiments which develop problems which do not impact the operation and safety of the orbiter will be classifed Criticality 3.

   Rationale: Loss of mission will refer to the overall orbiter mission not individual elements.

2. Analysis was only conducted on present experiments and support systems planned for future missions.

   Rationale: Experiments and support systems flown in the part which are not manifested on future mission are excluded from FMEA/CIL analysis.

3. OASIS Experiment excluded from this analysis.

   Rationale: OASIS is considered a payload by the Orbiter Project Office and is thus excluded from this analysis.

APPENDIX C
DETAILED ANALYSIS

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

LEGEND FOR IOA ANALYSIS WORKSHEETS

Hardware Criticalities:

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

Functional Criticalities:

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

Redundancy Screen A:

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

Redundancy Screens B and C:

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

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87
SUBSYSTEM: OEX
MDAC ID: 100

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 1/1
ABORT: 1/1

ITEM: SEADS NOSE CAP ASSEMBLY
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SEADS EXPERIMENT
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: NOSE CAP
PART NUMBER: V577-399252

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
BURN THROUGH MAY RESULT DURING ENTRY CAUSING POSSIBLE LOSS OF VEHICLE AND/OR CREW.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 1/1
MDAC ID: 101 ABORT: 1/1

ITEM: PRESSURE PORT (14)
FAILURE MODE: STRUCTURAL FAILURE, CRACK, BREAK LOOSE FROM NOSE CONE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SEADS EXPERIMENT
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: NOSE CONE
PART NUMBER: MC621-0007

CAUSES: VIBRATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:
HEAT DURING RE-ENTRY MAY SEVERELY DAMAGE VEHICLE. EVEN THOUGH ITEM IS REDUNDANT, FAILURE OF ANY ONE MAY RESULT IN LOSS OF VEHICLE.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 102 ABORT: 3/3

ITEM: PRESSURE PORT (14)
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SEADS EXPERIMENT
2)
3)
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: NOSE CONE
PART NUMBER: MC621-0007

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF DYNAMIC PRESSURE AND TEMPERATURE FOR EXPERIMENT SYSTEM. REDUNDANCY WILL AVOID TOTAL LOSS OF DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87
SUBSYSTEM: OEX
MDAC ID: 103

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

ITEM: PRESSURE TRANSDUCERS (28)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SEADS EXPERIMENT
2)
3)
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: NOSE CONE
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF DYNAMIC DATA TO PCM SLAVE # 2. INCOMPLETE DATA FOR EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87
SUBSYSTEM: OEX
MDAC ID: 104

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

ITEM: RESISTANCE TEMPERATURE DEVICE (8)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SEADS EXPERIMENT
2)
3)
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: NOSE CONE
PART NUMBER: ME449-0160-0008

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF TEMPERATURE DATA WHICH COMPENSATES THE DYNAMIC PRESSURE READING. ALSO INDICATES HEALTH OF INSULATION INSIDE NOSE CONE.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87
SUBSYSTEM: OEX
MDAC ID: 105

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

ITEM: RADIOMETER (6)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SEADS EXPERIMENT
2)
3)
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: NOSE CONE
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF TEMPERATURE DATA USED TO MEASURE DYNAMIC PRESSURE.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87
SUBSYSTEM: OEX
MDAC ID: 200

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

ITEM: SUMS INSTRUMENT ASSEMBLY
FAILURE MODE: STRUCTURAL FAILURE, SUPPORT LOOSE/BREAKS

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: NOSE WHEEL WELL
PART NUMBER: 3290600

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
POSSIBLE LOSS OF SUMS DATA. POSSIBLE INTERFERENCE WITH NOSE GEAR ON DEPLOYMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 201 ABORT: 3/3

ITEM: SUMS INSTRUMENT ASSEMBLY
FAILURE MODE: INTERNAL FAILURE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: NOSE WHEEL WELL
PART NUMBER: 3290600

CAUSES: MECHANICAL SHOCK, VIBRATION, SHORT

EFFECTS/RATIONALE:
LOSS OF SUMS DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 202 ABORT: 3/3

ITEM: PRESSURE ORIFICE
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: LOWER FUSELAGE SURFACE FORWARD OF NOSE WHEEL WELL
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF SUMS DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 203 ABORT: 3/3

ITEM: INLET SYSTEM
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF SUMS DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 204 ABORT: 3/3

ITEM: INLET SYSTEM
FAILURE MODE: FAILS TO OPEN/CLOSE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, LOSS OF INPUT, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SUMS DATA OR DAMAGE TO SUMS INSTRUMENT ASSEMBLY.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87
SUBSYSTEM: OEX
MDAC ID: 205

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

ITEM: INLET SYSTEM
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF SUMS DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 206

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

ITEM: SUMS ION PUMP POWER (FLC-3)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: RELAY OPEN, BAD PIN CONNECTION, POWER SUPPLY FAILURE

EFFECTS/RATIONALE:
LOSS OF POWER TO PUMP RESULTING IN LOSS OF DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 207 ABORT: 3/3

ITEM: SUMS ION PUMP POWER (FLC-3)
FAILURE MODE: SHORTED

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER TO PUMP RESULTING IN LOSS OF DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 208 ABORT: 3/3

ITEM: SUMS INSTRUMENT POWER (FLC-3)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: RELAY OPEN, BAD PIN CONNECTION, POWER SUPPLY FAILURE

EFFECTS/RATIONALE:
LOSS OF POWER TO MONITOR AND CONTROL EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 209 ABORT: 3/3

ITEM: SUMS INSTRUMENT POWER (FLC-3)
FAILURE MODE: SHORTED

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER RESULTING IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 210 ABORT: 3/3

ITEM: SUMS VACCUUM MAINTENANCE POWER (FLC-3)
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: RELAY OPEN, BAD PIN CONNECTION, POWER SUPPLY FAILURE

EFFECTS/RATIONALE:
LOSS OF VACUUM RESULTING IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 211

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

ITEM: SUMS VACUUM MAINTENANCE POWER (FLC-3)
FAILURE MODE: SHORTED

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER:

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER RESULTING IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 212

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

ITEM: PCM TO SUMS COMM. - PCM CLOCK
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER: PDS-700-10

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:
VAMS NOT COMMANDED TO OPERATE RESULTING IN LOSS OF DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 213 ABORT: 3/3

ITEM: PCM TO SUMS COMM. - DATA STROBE
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER: PDS-700-10

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:
LOSS OF PCM READ FUNCTION RESULTING IN LOSS OF DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 214 ABORT: 3/3

ITEM: SUMS TO PCM COMM. - DIGITAL DATA
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER: 3290600

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:
LOSS OF DIGITAL WORD BITS DATA RESULTING IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 215

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

ITEM: SUMS TO PCM COMM. - ANALOG DATA
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SUMS EXPERIMENT
2)
3)
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: FORWARD FUSELAGE
PART NUMBER: 3290600

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:
LOSS OF HOUSEKEEPING ANALOG DATA RESULTING IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87
SUBSYSTEM: OEX
MDAC ID: 300

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

ITEM: PULSE CODE MODULATOR - SLAVE #2
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) FORWARD FUSELAGE SUPPORT SYSTEM (FFSS0)
2)
3)
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: NOSE WHEEL WELL
PART NUMBER: PDS-700-10

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
POSSIBLE LOSS OF SEADS AND/OR SUMS DATA POSSIBLE INTERFERANCE WITH NOSE GEAR ON DEPLOYMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 301 ABORT: 3/3

ITEM: PULSE CODE MODULATOR - SLAVE #2
FAILURE MODE: INTERNAL FAILURE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) FORWARD FUSELAGE SUPPORT SYSTEM
2)
3)
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: NOSE WHEEL WELL
PART NUMBER: PDS-700-10

CAUSES: MECHANICAL SHOCK, VIBRATION, SHORT

EFFECTS/RATIONALE:
LOSS OF SEADS AND/OR SUMS DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 302 ABORT: 3/3

ITEM: STATIC PRESSURE TRANSDUCER (12)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) FORWARD FUSELAGE SUPPORT SYSTEM
2)
3)
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: FORWARD FUSELAGE
PART NUMBER: ME449-0178-0104, ME449-0178-2101

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF STATIC PRESSURE DATA TO SUMS AND SEADS.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87
SUBSYSTEM: OEX
MDAC ID: 303

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

ITEM: RESISTANCE TEMPERATURE DEVICE (7)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) FORWARD FUSELAGE SUPPORT SYSTEM
2)
3)
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: FORWARD FUSELAGE
PART NUMBER: ME449-0160-0008

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF TEMPERATURE DATA MAY INVALIDATE SUMS AND SEADS DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/10/87
SUBSYSTEM: OEX
MDAC ID: 304

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

ITEM: TEMPERATURE SIGNAL CONDITIONER (8)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) FORWARD FUSELAGE SUPPORT SYSTEM
2)
3)
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: FORWARD FUSELAGE
PART NUMBER: STA 4760023 ME-0010

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF DATA MAY INVALIDATE SEADS DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/15/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 400 ABORT: 3/3

ITEM: PRESSURE SYSTEM AND DCM MOUNT
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2) SILTS EQUIPMENT INSTALLATION
3)
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: VERTICAL FIN POD
PART NUMBER: S1L416149-1H-2

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
GN2 TANKS COULD BREAK FREE AND RUPTURE. THIS WOULD AFFECT FLOW OF GAS TO EXPERIMENT CAUSING POSSIBLE LOSS OF CAMERA DATA.

REFERENCES: V565-707001, ICD-3-0048-02

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 401 ABORT: 3/3

ITEM: GN2 TANKS
FAILURE MODE: EXTERNAL LEAKAGE, STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2) SILTS EQUIPMENT INSTALLATION
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:
GN2 TANKS RUPTURE OR LEAK AFFECTING FLOW TO GAS TO EXPERIMENT, CAUSING POSSIBLE LOSS OF CAMERA DATA. THIS RUPTURE MAY AT WORSE CAUSE LOSS OF SOME TILES ON VERTICAL FIN, WHICH HAS PROVEN NOT TO BE OF CONCERN.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 402 ABORT: 3/3

ITEM: FILL VALVE
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
WILL CAUSE LOSS OF GN2 FROM ONE TANK. OTHER TANK WILL PROVIDE GAS FOR EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/18/87
SUBSYSTEM: OEX
MDAC ID: 403

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

ITEM: RUPTURE DISK
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEMS, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
PRESSURE CAN BUILD UP IN TANK, HOWEVER TANK BURST PRESSURE 3 TIMES GREATER THAN LOAD PRESSURE.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 404 ABORT: 3/3

ITEM: RUPTURE DISK
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
WILL CAUSE LOSS OF GN2 FROM ONE TANK. OTHER TANK WILL PROVIDE GAS FOR EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 405 ABORT: 3/3

ITEM: FILTER
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
WILL CAUSE RESTRICTED FLOW FROM ONE TANK, BUT OTHER TANK IS AVAILABLE.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 406

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

ITEM: LATCHING SOLENOID VALVE
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: LOSS OF INPUT

EFFECTS/RATIONALE:
LOSS OF VALVE RESULTS IN LOSS OF THIS PRESSURE SYSTEM FOR EXPERIMENT. OTHER SYSTEM AVAILABLE.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87
SUBSYSTEM: OEX
MDAC ID: 407

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

ITEM: CHECK VALVE
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF THIS PRESSURE SYSTEM FOR EXPERIMENT. OTHER SYSTEM AVAILABLE.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 408 ABORT: 3/3

ITEM: FILTER
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS WILL RESULT IN NO N2 FOR EXPERIMENT. LOSS OF EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 409 ABORT: 3/3

ITEM: CHECK VALVE
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO N2 AVAILABLE TO EXPERIMENT. LOSS OF EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 410 ABORT: 3/3

ITEM: CHECK VALVES
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEMS, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO N2 AVAILABLE TO COOL CAMERA. LOSS OF EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 411 ABORT: 3/3

ITEM: FILTER
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO WINDOW COOLING NOR PRESSURE TO PIN PULLERS. LOSS OF EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87
SUBSYSTEM: OEX
MDAC ID: 412

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

ITEM: PRESSURE REDUCTION COIL
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: MECHANICAL SHOCK

EFFECTS/RATIONALE:
LOSS OF N2 TO WINDOWS AND PIN PULLERS. LOSS OF EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87
SUBSYSTEM: OEX
MDAC ID: 413

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

ITEM: PRESSURE REDUCTION COIL
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
NO N2 TO WINDOWS AND PIN PULLERS. LOSS OF EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 415 ABORT: 3/3

ITEM: ORIFICES
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:
LOSS OF N2 FLOW TO WINDOWS CAUSING WINDOW OVERHEATING AND POSSIBLE LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 416 ABORT: 3/3

ITEM: PIN PULLERS
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) PRESSURE SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF N2 FLOW TO PIN PULLERS WILL RESULT IN WINDOW PLUGS NOT BEING PULLED. LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 417

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

ITEM: HEATER SWITCH, SILTS
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) THERMAL CONTROL, SILTS
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL A7A2
PART NUMBER:

CAUSES: CONTAMINATION, CORROSION, BROKEN CONNECTOR

EFFECTS/RATIONALE:
TEMPERATURE NOT MAINTAINED FOR EXPERIMENT. DATA LOSS OR INVALID.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 418

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

ITEM: THERMOSTAT (3)
FAILURE MODE: FAILS TO START/STOP

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) THERMAL SYSTEM, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: STRUCTURAL FAILURE

EFFECTS/RATIONALE:
TEMPERATURE NOT MAINTAINED FOR EXPERIMENT. DATA LOSS OR INVALID.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 419 ABORT: 3/3

ITEM: HEATERS (3)
FAILURE MODE: FAILS TO START

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) THERMAL CONTROL, SILTS
2)
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: STRUCTURAL FAILURE, LOSS OF INPUT

EFFECTS/RATIONALE:
CAMERA, DCM AND PRESSURE SYSTEM MAY NOT OPERATE PROPERLY IF TEMPERATURE NOT MAINTAINED. PARTIAL TO TOTAL LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, 7.1; STS 83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 420 ABORT: 3/3

ITEM: DATA CONTROL MODULE (DCM)
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SILTS EQUIPMENT INSTALLATION
2)
3)
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: VERTICAL FIN POD
PART NUMBER: S1L416120-1G-2

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
DEGRADED OR LOSS OF EXPERIMENT DATA.

REFERENCES: V56-707001, ICD-3-0048-02, OEX CARGO SYSTEMS MANUAL

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/21/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 421

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

ITEM: SOLENOID RELAY, DCM
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) DATA CONTROL MODULE
2) SILTS EXPERIMENT
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: ERRONEOUS INPUT, VIBRATION

EFFECTS/RATIONALE:
LOSS OF N2 BEFORE NEEDED, RESULTING IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, ICD-3-0048-02

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/21/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 422

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

ITEM: SOLENOID RELAY, DCM
FAILURE MODE: FAILS TO SWITCH

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) DATA CONTROL MODULE
2) SILTS EXPERIMENT
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, LOSS OF INPUT

EFFECTS/RATIONALE:
N2 WILL NOT BE SUPPLIED TO COOL EXPERIMENT RESULTING IN POSSIBLE LOSS OF DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, ICD-3-0048-02

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	5/21/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	OEX	FLIGHT:	3/3
MDAC ID:	423	ABORT:	3/3

ITEM: WINDOW ASSEMBLY
FAILURE MODE: STRUCTURAL FAILURE, BREAKS/CRACKS

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) DOME ASSEMBLY
2) SILTS EQUIPMENT INSTALLATION
3)
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: VERTICAL FIN POD
PART NUMBER: LD416361

CAUSES: MECHANICAL SHOCK, OVERLOAD, TEMPERATURE, VIBRATION

EFFECTS/RATIONALE:
INCREASE IN DOME TEMPERATURE AND POSSIBLE CAMERA DAMAGE. LOSS OF EXPERIMENT DATA.

REFERENCES: V565-707001, ICD-3-0048-02

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 424 ABORT: 3/3

ITEM: CAMERA ASSEMBLY
FAILURE MODE: ERRATIC OPERATION, INTERMITTENT OPERATION, PHYSICAL BINDING/JAMMING, LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) DOME ASSEMBLY
2) SILTS EQUIPMENT INSTALLATION
3)
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: VERTICAL FIN POD
PART NUMBER:

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

EFFECTS/RATIONALE:
WITHOUT GOOD CAMERA OPERATION, EXPERIMENT DATA WILL BE DEGRADED OR LOSS.

REFERENCES: V565-707001, ICD-3-0048-02

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/21/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 425 ABORT: 3/3

ITEM: BLACKBODY ASSEMBLY
FAILURE MODE: INTERMITTENT OPERATION, LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) DOME ASSEMBLY
2) SILTS EQUIPMENT INSTALLATION
3)
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: VERTICAL FIN POD
PART NUMBER:

CAUSES: TEMPERATURE, LOSS OF INPUT

EFFECTS/RATIONALE:
LOSS OF BLACK BODY RESULTING IN REDUCED QUALITY OF EXPERIMENT DATA.

REFERENCES: V565-707001, ICD-3-0048-02, OEX CARGO SYSTEMS MANUAL

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 426

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

ITEM: SILTS ENABLE SWITCH
FAILURE MODE: FAILS TO SWITCH

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) SILTS EXPERIMENT
2)
3)
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: A7 PANEL
PART NUMBER:

CAUSES: PIECE-PART FAILURE, CHEMICAL REACTION

EFFECTS/RATIONALE:
EXPERIMENT CAN STILL BE ENABLED BY GROUND THROUGH TELEMETRY.

REFERENCES: V565-707001, ICD-3-0048-02, OEX CARGO SYSTEMS MANUAL

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87
SUBSYSTEM: OEX
MDAC ID: 500

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

ITEM: TRIAXIAL ACCELEROMETER/GYRO INSTRUMENT PACKAGE
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 2359220

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
INCOMPLETE DATA FOR ACIP EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87
SUBSYSTEM: OEX
MDAC ID: 501

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

ITEM: TRIAXIAL ANGULAR ACCELEROMETER
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 2359220

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
INCOMPLETE DATA FOR ACIP EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87
SUBSYSTEM: OEX
MDAC ID: 502

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

ITEM: TRIAXIAL VIBRATION SENSOR
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 2359220

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
INCOMPLETE DATA FOR ACIP EXPERIMENT

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87
SUBSYSTEM: OEX
MDAC ID: 503

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

ITEM: HIGH RESOLUTION LINEAR ACCELEROMETER PACKAGE
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 3291560

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
INCOMPLETE DATA FOR ACIP EXPERIMENT

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 504 ABORT: 3/3

ITEM: DATA HANDLING ELECTRONICS
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 2359220

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
INCOMPLETE DATA FOR ACIP EXPERIMENT. THIS SYSTEM CHANGES BOTH ACIP AND HIRAP SENSOR SIGNALS TO 14-BIT RESOLUTION. LOSS OF SYSTEM WILL CAUSE LOSS OF RAW DATA AND HOUSEKEEPING DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 505 ABORT: 3/3

ITEM: MINI DATA HANDLING ELECTRONICS
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 2359250

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
LOSS OF CONTROL SURFACE SIGNALS AND ONE RCS PRESSURE SIGNAL FOR ACIP EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 506 ABORT: 3/3

ITEM: PCM SLAVE
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 2359218

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
LOSS OF ACIP HOUSEKEEPING DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 507 ABORT: 3/3

ITEM: PCM MASTER
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: PAYLOAD BAY
PART NUMBER: 2359221

CAUSES: VIBRATION, LOOSE PIN(S)

EFFECTS/RATIONALE:
LOSS OF ACIP, SEADS, SUMS AND/OR FFSO DATA TO RECORDER.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 508 ABORT: 3/3

ITEM: PAYLOAD TIMING BUFFER GMT #8
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: FLIGHT DECK
PART NUMBER: MC456-0060-0001

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NONE, PCM MASTER HAS ITS OWN INTERNAL TIMING.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	6/18/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	OEX/EPD&C	FLIGHT:	3/3
MDAC ID:	509	ABORT:	3/3

ITEM: ISOLATION DIODE-ACIP ON CMD
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: JANTXV1N5551

CAUSES: CONTAMINATION, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF COMAND TO POWER UP ACIP EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

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INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 510 ABORT: 3/3

ITEM: ISOLATION DIODE-ACIP ON CMD
FAILURE MODE: SHORTED

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: JANTXV1N5551

CAUSES: CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
POSSIBLE LOSS OF EXPERIMENT DATA IF "ON" COMMAND CHANNEL IS DAMAGED.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 511 ABORT: 3/3

ITEM: REMOTE POWER CONTROLLER-42
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP ON CMD
2) ACIP EXPERIMENT
3)
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: MIDBODY
PART NUMBER: MC450-0017-1100

CAUSES: PIECE-PART FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER TO ACIP EXPERIMENT.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 512

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

ITEM: REMOTE POWER CONTROLLER-42
FAILURE MODE: INADVERTENT OPERATION

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP ON CMD
2) ACIP EXPERIMENT
3)
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: MIDBODY
PART NUMBER: MC450-0017-1100

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

EFFECTS/RATIONALE:
POWERS ON ACIP EXPERIMENT WHEN NOT NEEDED, CAUSING USE OF ORBITER POWER.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 513

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

ITEM: RESISTOR
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP HEATER CONTROL CIRCUIT
2) ACIP EXPERIMENT
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL R11
PART NUMBER: RWR8051211FR

CAUSES: MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF HEATER FUNCTION TO ACIP PACKAGE WHICH COULD AFFECT EXPERIMANT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 514 ABORT: 3/3

ITEM: ACIP HEATER SWITCH
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL R11
PART NUMBER: ME452-0102-7101

CAUSES: CONTAMINATION, STRUCTURAL FAILURE

EFFECTS/RATIONALE:
LOSS OF HEATER FUNCTION TO ACIP PACKAGE WHICH COULD AFFECT EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 515 ABORT: 3/3

ITEM: ACIP HEATER SWITCH
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

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

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

LOCATION: PANEL R11
PART NUMBER: ME452-0102-7101

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT-EXTRA USE OF ORBITER POWER.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 516 ABORT: 3/3

ITEM: REMOTE POWER CONTROLLER-41
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: MIDBODY
PART NUMBER: MC450-0017-1100

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, THERMAL SHOCK

EFFECTS/RATIONALE:
LOSS OF HEATER FUNCTION TO ACIP PACKAGE WHICH COULD AFFECT EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/18/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 517 ABORT: 3/3

ITEM: REMOTE POWER CONTROLLER-41
FAILURE MODE: INADVERTENT OPERATION

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: MIDBODY
PART NUMBER: MC450-0017-1100

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT-EXTRA USE OF ORBITER POWER.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 518

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

ITEM: HYBRID DRIVER
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) FWD LCA 3
2) ACIP EXPERIMENT
3)
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: PAYLOAD BAY
PART NUMBER: MC477-0263-0002

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
LOSS OF POWER TO PCM MASTER AND SLAVE UNITS. WILL CAUSE LOSS OF ACIP, SUMS, SEADS AND FFSO DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 519

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

ITEM: HYBRID DRIVER
FAILURE MODE: INADVERTENT OPERATION

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) FWD LCA 3
2) ACIP EXPERIMENT
3)
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: PAYLOAD BAY
PART NUMBER: MC477-0263-0002

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:
NO EFFECT-EXTRA USE OF ORBITER POWER.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 520

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

ITEM: ISOLATION DIODE-ACIP CALIB
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: JANTXV1N5551

CAUSES: CONTAMINATION, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF CALIBRATE COMMAND TO ACIP. COULD INVALIDATE DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 521 ABORT: 3/3

ITEM: ISOLATION DIODE-ACIP CALIB
FAILURE MODE: SHORTED

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ACIP EXPERIMENT
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: JANTXV1N5551

CAUSES: CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
POSSIBLE LOSS OF COMMAND TO CALIBRATE ACIP WHICH COULD INVALIDATE DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 600 ABORT: 3/3

ITEM: OEX RECORDER
FAILURE MODE: ERRATIC OPERATION, PHYSICAL BINDING/JAMMING, FAILS TO OPERATE

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) OEX SS0
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: V565-763200

CAUSES: MECHANICAL SHOCK, STRUCTURAL FAILURE, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF ALL OEX EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 601 ABORT: 3/3

ITEM: HYBRID RELAY
FAILURE MODE: FAILS TO SWITCH

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ICM/SCM
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: MC455-0135-0001

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

EFFECTS/RATIONALE:
LOSS OF CONTROL TO DRIVER WHICH POWERS THE PCM MASTER AND SLAVE. LOSS OF POWER TO PCM WILL CAUSE LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 602

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

ITEM: HYBRID RELAY
FAILURE MODE: PREMATURE OPERATION

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ICM/SCM
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: MC455-0135-0001

CAUSES: STRUCTURAL FAILURE, VIBRATION, INADVERTENT OPERATION

EFFECTS/RATIONALE:
LOSS OF RECORDING TIME AND ORBITER ENERGY UNNECESSARILY.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX/EPD&C FLIGHT: 3/3
MDAC ID: 603 ABORT: 3/3

ITEM: ISOLATION DIODE-OEX PCM/RCDR ON
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ICM/SCM
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: JANTXV1N5551

CAUSES: CONTAMINATION, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF COMMAND TO POWER PCM AND RECORDER. COULD RESULT IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87
SUBSYSTEM: OEX/EPD&C
MDAC ID: 604

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

ITEM: ISOLATION DIODE-OEX PCM/RCDR ON
FAILURE MODE: SHORTED

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ICM/SCM
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: JANTXV1N5551

CAUSES: CONTAMINATION, THERMAL SHOCK

EFFECTS/RATIONALE:
POSSIBLE LOSS OF COMMAND TO POWER UP PCM AND RECORDER WHICH WOULD RESULT IN LOSS OF DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	6/19/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	OEX/EPD&C	FLIGHT:	3/3
MDAC ID:	605	ABORT:	3/3

ITEM: RESISTOR
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) ICM/SCM
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER: RWR8051211FR

CAUSES: CONTAMINATION, MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
LOSS OF COMMAND TO POWER PCM AND RECORDER. COULD RESULT IN LOSS OF EXPERIMENT DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/19/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: OEX FLIGHT: 3/3
MDAC ID: 606 ABORT: 3/3

ITEM: TRANSDUCERS, SENSORS (INSTRUMENTATION)
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: J. COMPTON SUBSYS LEAD: J. COMPTON

BREAKDOWN HIERARCHY:
1) OEX RECORDER
2)
3)
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: CREW COMPARTMENT VOLUME D
PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:
ALL SENSORS ON THE OEX SYSTEM ARE FOR DOWNLIST DATA. FAILURE WILL ONLY RESULT IN LOSS OF RECORDER DATA.

REFERENCES: OEX CARGO SYSTEMS MANUAL, STS-83-0546A

APPENDIX D
POTENTIAL CRITICAL ITEMS

MDAC ID	ITEM	FAILURE MODE
100	SEADS Nose Cap Assembly	Structural Failure
101	Pressure Ports	Structural Failure

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