

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE  
 NUMBER: 05-5-B03-5 -X

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

REVISION: 9 01/10/94

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: MULTIPLEXER-DEMULTIPLEXER HONEYWELL	MC615-0004-5710 4020534-947
LRU	: MULTIPLEXER-DEMULTIPLEXER HONEYWELL	MC615-0004-6710 4020534-967

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
 PAYLOAD FORWARD MDM: "PF1" AND "PF2".

REFERENCE DESIGNATORS: B1V72A38  
 B2V72A34

QUANTITY OF LIKE ITEMS: 2  
 TWO

FUNCTION:

PROVIDES MULTIPLEXED INTERFACE BETWEEN THE COMPUTER AND THE PAYLOAD BAY DOORS, CAUTION AND WARNING (C&W), KU-BAND ANTENNA, ETC., TO STATUS ALL PARAMETERS, AND TO OPEN/CLOSE PAYLOAD BAY DOORS. MDM PL1 INTERFACES SYSTEM MANAGEMENT (SM) GENERAL PURPOSE COMPUTER (GPC) COMMANDS WITH THE KU-BAND RADAR/DATA (UTILIZED BY GUIDANCE NAVIGATION AND CONTROL (GN&C) COMPUTERS DURING RENDEZVOUS).

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 05-5-B03-5- 01

REVISION#: 10 03/27/96

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

LRU: MULTIPLEXER-DEMULTIPLEXER

ITEM NAME: MULTIPLEXER-DEMULTIPLEXER

CRITICALITY OF THIS

FAILURE MODE: 1R2

FAILURE MODE:  
LOSS OF OUTPUT

MISSION PHASE:	PL	FRE-LAUNCH
	LO	LIFT-OFF
	OO	ON-ORBIT
	DO	DE-ORBIT
	LS	LANDING/SAFING

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	102	COLUMBIA
	103	DISCOVERY
	104	ATLANTIS
	105	ENDEAVOUR

CAUSE:  
PIECE-PART FAILURE, VIBRATION, CONTAMINATION, TEMPERATURE, CHEMICAL REACTION, FAILED MDM PORT SEQUENCE CONTROL UNIT (SCU), MULTIPLEXER INTERFACE ADAPTER (MIA), POWER SUPPLIES OR I/O CARD/CHANNEL FAILURES.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN	A) PASS
	B) PASS
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL FAILURE MODE  
 NUMBER: 05-5-B03-5-01

---

- FAILURE EFFECTS -

---

(A) SUBSYSTEM:  
 LOSS OF MDM.

(B) INTERFACING SUBSYSTEM(S):  
 LOSS OF ONE PATH TO ACCOMPLISH PAYLOAD FUNCTIONS AND MONITORING AND TO OPEN/CLOSE PAYLOAD BAY DOORS. LOSS OF PL1 LOSES CAPABILITY TO POINT/STOW KU-BAND ANTENNA REQUIRED FOR RENDEZVOUS.

(C) MISSION:  
 POSSIBLE EARLY MISSION TERMINATION DECISION DUE TO LOSS OF REDUNDANT PATH TO OPEN PAYLOAD BAY DOORS (4 1/2 HOUR WINDOW) DUE TO HEATING.

(D) CREW, VEHICLE, AND ELEMENT(S):  
 NO EFFECT FIRST FAILURE. POSSIBLE LOSS OF CREW/VEHICLE AFTER SECOND FAILURE

(E) FUNCTIONAL CRITICALITY EFFECTS:  
 CRITICALITY 1R2 BECAUSE OF THE FOLLOWING REASON:

FOR CONTINGENCY DEORBIT, ON THE SECOND RELATED FAILURE CAUSING LOSS OF CONTROL OF MOTORS ON THE SAME (RIGHT OR LEFT) PAYLOAD BAY DOOR, COULD PRECLUDE PROPER CLOSING/LATCHING OF THAT DOOR. OTHERWISE SECOND FAILURE CONDITION COULD RESULT IN NOT BEING ABLE TO ENTER SAFELY.

DURING NOMINAL DEORBIT, CONTINGENCY EVA OR PIN KIT IFM MAY BE USED FOR CLOSING/LATCHING DOORS.

---

-DISPOSITION RATIONALE-

---

(A) DESIGN:  
 ALL PARTS SELECTED FROM MFJ004-400 ORBITER PROJECT PARTS LIST (OPPL) WHICH CALLS FOR JANTXV LEVEL PARTS, OR HAVE ADEQUATE DERATING FACTORS OF 25-50% ON HYBRIDS & TRANSISTORS, 25-30% ON RESISTORS, CAPACITORS AND OTHER COMPONENTS. PARTS THAT DID NOT MEET ORBITER PROJECT PARTS LIST REQUIREMENTS FOR QUALIFICATION, TRACEABILITY SCREENING OR BURN-IN WERE REVIEWED AND WERE FOUND ACCEPTABLE FOR THEIR GIVEN FUNCTIONS. REDUNDANT COMMAND/SIGNALS FOR CRITICAL FUNCTIONS ROUTED THROUGH SEPARATE MDM'S. DESIGN ALSO INCORPORATES RELIABILITY, MAINTAINABILITY, ENVIRONMENTAL AND TRANSPORTABILITY REQUIREMENTS AND OTHER DESIGNS AND CONSTRUCTION PER SPECIFICATION MC615-0004.

## FAILURE MODES EFFECTS ANALYSIS (FMEA) - CILT FAILURE MODE

NUMBER: 05-5-B03-5-01

**(B) TEST:**

EACH UNIT SUBJECTED TO ACCEPTANCE TEST PROCEDURE (ATP) TEST (T4025545) AT HONEYWELL INCLUDING CONTINUITY, FULL FUNCTIONAL, ACCEPTANCE VIBRATIONAL TEST (AVT), ACCEPTANCE THERMAL TEST (ATT), EXAMINATION OF PRODUCT, INSULATION RESISTANCE TEST, DIELECTRIC STRENGTH TEST, PERFORMANCE, AND POWER VARIATION TEST.

QUALIFICATION TEST (T4025783) COMPLETED AT HONEYWELL INCLUDING FULL FUNCTIONAL, POWER, ELECTROMAGNETIC COMPATIBILITY (EMC), HUMIDITY, THERMAL, VIBRATION, THERMAL VACUUM, LIGHTNING, SHOCK, SALT/FOG, 1000 ON/OFF CYCLE LIFE TEST, ACCELERATION, AND EXPLOSIVE/CORROSIVE ATMOSPHERE.

GROUND TURNAROUND TEST: ALL TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

**(C) INSPECTION:**

## RECEIVING INSPECTION

CERTIFICATIONS & SOURCE INSPECTION TEST REPORTS ARE ON FILE. CASES AND FLATPACKS ARE ENVIRONMENTALLY SCREENED, INCLUDING LOOSE PARTICLE DETECTION IN RECEIVING INSPECTION. ALL HYBRID COMPONENTS ARE LQT. SAMPLED IN RECEIVING INSPECTION.

## CONTAMINATION CONTROL

CLEANLINESS TO CLASS 100,000 LEVEL IS VERIFIED BY INSPECTION.

## ASSEMBLY/INSTALLATION

VISUAL INSPECTION IS PERFORMED AT KIT RELEASE. PRINTED WIRING BOARD MICROSECTION ANALYSIS IS PERFORMED AND MONITORED BY INSPECTION. QUALITY CONTROL VERIFIES AND WITNESSES TORQUE OPERATIONS. QUALITY CONTROL VERIFIES SOLDERED CONNECTIONS AND ASSEMBLY OF PARTS. TOOL CERTIFICATION AND TENSILE TESTS ARE MAINTAINED. QUALITY CONTROL PERFORMS PRE-CAP VISUAL INSPECTION FOR CLEANLINESS. QUALITY CONTROL VERIFIES CONVEYOR FURNACE PROFILE/TEMPERATURE EVERY 90 DAYS. QUALITY CONTROL VERIFIES ALL FLATNESS & SURFACE ROUGHNESS FOR PROPER HEAT TRANSFER. THERMAL PROTECTION CONTROLS EXIST FOR ALL SOLDERED CONNECTIONS.

## NONDESTRUCTIVE EVALUATION

RADIOGRAPHIC INSPECTION OF SELECTED COMPONENTS, I.E., TANTALUM CAPACITORS, IS PERFORMED

## CRITICAL PROCESSES

INSPECTION VERIFIES CRIMPING OPERATIONS AND CERTIFICATION. SOLDERING REQUIREMENTS PER NHB5300.4(3A) ARE VERIFIED BY INSPECTION.

## TESTING

ATP IS OBSERVED AND VERIFIED BY QUALITY CONTROL, INCLUDING AVT AND ATT

## HANDLING/PACKAGING

PROPER GROUNDING OF ELECTRICALLY STATIC SENSITIVE DEVICES WHEN HANDLING IS PERFORMED. PACKAGING AND PROTECTION VERIFIED BY INSPECTION

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE  
NUMBER: 05-5-B03-5-01

(D) FAILURE HISTORY:

CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRAGA DATABASE

(E) OPERATIONAL USE:

PORT MODING TO RECOVER MDM FUNCTIONALITY IS AVAILABLE AS FOLLOWS:

A) MM102 - PORTMODING WILL NOT BE PERFORMED UNLESS IT IS NECESSARY FOR CRITICAL CAPABILITY.

B) POST MM102 TO PRE MECO - PORTMODING MAY BE PERFORMED TO REGAIN CRITICAL CAPABILITY OR AFTER ANY SECOND FAILURE. NON-CRITICAL RECOVERY WILL NOT BE PERFORMED FOR NON-UNIVERSAL I/O ERROR CASES.

C) POST MECO - PORTMODING MAY BE PERFORMED IN ANY VALID PHASE OR OPS, EXCEPT FOR NON-UNIVERSAL I/O ERROR CASES.

(REFERENCE FLIGHT RULE 7-31)

- APPROVALS -

EDITORIALLY APPROVED	: RI	<u>R. Abell</u>
EDITORIALLY APPROVED	: JSC	<u>Tom Liberty 7-31-96</u>
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 96-CIL-013_05-9