

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE
NUMBER: 05-5-803-7A -X**

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

REVISION: 7

04/08/91

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRJ	: E-MULTIPLEXER-DEMULTIPLEXER HONEYWELL	MC615-0004-7400 8258000-904

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
OPERATIONAL INSTRUMENTATION AFT EMDM: "OA1", "OA2", AND "OA3".**

**REFERENCE DESIGNATORS: S4V75A13
 S5V75A14
 S6V75A15**

**QUANTITY OF LIKE ITEMS: 3
THREE**

FUNCTION:

UPON REQUEST, PROVIDES DIGITIZED AND PROCESSED DATA TO THE PULSE CODE MODULATION (PCM) MASTER UNIT FOR OPERATIONAL INSTRUMENTATION WHERE IT IS INTERLEAVED WITH ALL OTHER DATA INTO ONE SERIAL PCM STREAM. PROVIDES AUXILIARY POWER UNIT'S (APU) TEST LINE, FUEL LINE, FUEL PUMP DRAIN LINE, AND FUEL ISOLATION VALVE TEMPERATURE STATUS TO PREVENT HYDRAZINE DETONATION, PLUS FUEL TANK LEAK MONITORING CAPABILITIES
OA EMDMS ARE ALSO USED TO MONITOR AND TRANSMIT MPS HELIUM SYSTEM SAFETY DATA FOR LCC

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: 05-5-B03-7A-01

REVISION#: 8 04/01/96

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

LRU: E-MULTIPLEXER-DEMULTIPLEXER

CRITICALITY OF THIS

ITEM NAME: E-MULTIPLEXER-DEMULTIPLEXER

FAILURE MODE: 1R2

FAILURE MODE:

LOSS OF OUTPUT

MISSION PHASE:

PL PRE-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 FRACTURE, VIBRATION, CONTAMINATION, TEMPERATURE, CHEMICAL REACTION, FAILED EMDM PORT - SEQUENCE CONTROL UNIT (SCU), MULTIPLEXER INTERFACE ADAPTER (MIA), POWER SUPPLY 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 EFFECTS -

(A) SUBSYSTEM:

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL FAILURE MODE
NUMBER: 05-5-803-7A- 01

LOSS OF EMDM.

(B) INTERFACING SUBSYSTEM(S):
LOSS OF DATA ASSOCIATED WITH THE FAILED EMDM.

(C) MISSION:
POSSIBLE LOSS OF MISSION.

(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:

EXISTING CHANNELIZATION ALLOWS A SINGLE "OA" EMDM FAILURE TO CAUSE THE
LOSS OF ALL APU FUEL TANK INSTRUMENTATION FOR A SINGLE SYSTEM. A FUEL LEAK
IS A POSSIBLE CRITICALITY 1 FAILURE RESULTING IN LOSS OF CREW/VEHICLE. IF
THERE IS A FUEL LEAK BETWEEN THE TANK AND THE ISOLATION VALVES, IT IS
UNLIKELY THAT IT WILL BE DETECTED WITHOUT FUEL TANK PRESSURE AND/OR
TEMPERATURE MEASUREMENTS. RESULTS IN LOSS OF THE OPPORTUNITY TO
MINIMIZE THE DELETERIOUS EFFECTS OF LEAK.

-DISPOSITION RATIONALE-

(A) DESIGN:
ALL PARTS SELECTED FROM MF0004-400 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) - GIL FAILURE MODE
NUMBER: 05-5-803-7A-01

(B) TEST:

EACH UNIT SUBJECTED TO ACCEPTANCE TEST PROCEDURE (ATP) TEST (TP8258000) AT HONEYWELL INCLUDING CONTINUITY, FULL FUNCTIONAL, ACCEPTANCE VIBRATION TEST (AVT), ACCEPTANCE THERMAL TEST (ATT), EXAMINATION OF PRODUCT, INSULATION RESISTANCE TEST, DIELECTRIC STRENGTH TEST, PERFORMANCE, AND POWER VARIATION TEST.

QUALIFICATION TEST (T8258181) COMPLETED AT SPERRY 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 LOT 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 NH85300.4(3A) AND ISCO8800A 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-B03-7A-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 PRACA DATABASE

(E) OPERATIONAL USE:

PORT MODING TO RECOVER EMDM FUNCTIONALITY IS AVAILABLE DURING ALL MISSION PHASES BUT IT IS ONLY RECOMMENDED AND USED DURING NON DYNAMIC PHASE.

- APPROVALS -

EDITORIALLY APPROVED : RI
EDITORIALLY APPROVED : JSC
TECHNICAL APPROVAL : VIA APPROVAL FORM

R. Stoll, Jr.
Sam. Daniels 7-21-96
96-CIL-013_05-5