

**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: 54V75A13
55V75A14
56V75A15**

**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-92

REVISION#: 8 04/01/96

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

LRU: E-MULTIPLEXER-DEMUTIPLEXER

CRITICALITY OF THIS

ITEM NAME: E-MULTIPLEXER-DEMUTIPLEXER

FAILURE MODE: 1R2

FAILURE MODE:
ERRONEOUS OUTPUTMISSION PHASE: PL PRE-LAUNCH
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT
LS LANDING/SAFINGVEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOUR

CAUSE:

PIECE PART FAILURE, VIBRATION, CONTAMINATION, TEMPERATURE, CHEMICAL REACTION, ADDRESS CHECK FAILURE, DATA ERROR TO EMDM MODULE, OR ANALOG/DIGITAL (A/D) CONVERTER FAILURE.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) FAIL
C) PASS

PASS/FAIL RATIONALE:

A)

B)

FAILS SCREEN B BECAUSE SOURCE OF ERRONEOUS OUTPUT CANNOT BE IDENTIFIED AND MAY BE ACCEPTED AS A VALID DATA.

C)

- FAILURE EFFECTS -

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(A) SUBSYSTEM:
LOSS OF EMDM.

(B) INTERFACING SUBSYSTEM(S):
TRANSMISSION OF ERRONEOUS DATA BY THE FAILED EMDM MAY RESULT IN
NUMEROUS MASTER ALARMS AND SYSTEM MANAGEMENT (SM) ALERTS.

(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:

- 1) OA1 EMDM FAILS GIVING ERRONEOUS OUTPUT VALUES FOR THE MPS HELIUM
PRESSURE LCC LIMITS.
- 2) ASSOCIATED REGULATOR FAILS OPEN AFTER TERMINATION OF AFT COMPARTMENT
HELIUM HGDS (HAZARDOUS GAS DETECTION SYSTEM) LCC (T-9 MINUTES) AND HELIUM
SUPPLY PRESSURE LCC (T-13 SECONDS). THE FAILURE IS NOT REFLECTED IN THE
FAILED EMDM OUTPUT TO TLM/GROUND.
REGULATOR OUTLET PRESSURE LCC LIMITS CONTINUES UNTIL T-10 SECONDS. THE
HELIUM OUTPUT PRESSURE MEASUREMENTS (MPS E1-REG B, MPS E2-REG B, MPS E3-
REG B) ARE CHANNELIZED THROUGH OA1. THE FAILED EMDM WILL NOT REFLECT THE
FAILED OPEN REGULATOR CONDITION
IF AN OA1 CHANNELIZED HELIUM REGULATOR FAILS OPEN AFTER T-13 SECONDS AND
THE EMDM HAS FAILED SUCH THAT REGULATORS PRESSURE ARE MASKED, THE
RESULTS ARE AN LCC DECEPTION AND LIFT OFF WITH FAILED OPEN REGULATOR.
REGULATOR OUTLET PRESSURE LCC LIMITS CONTINUES UNTIL T-10 SECONDS.
THESE FAILURES AFTER T-13 SECONDS RESULT IN LCC DECEPTION AND LIFT OFF WITH
FAILED OPEN REGULATOR. FLIGHT WITH THIS CONDITION MAY RESULT IN
OVERPRESSURIZATION/EXPLOSION OF THE AFT COMPARTMENT (REF. 03-1CB-0743-01).

-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

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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.

(B) TEST:

EACH UNIT SUBJECTED TO ACCEPTANCE TEST PROCEDURE (ATP) TEST (TP8258000) 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 (T8258181) 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 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

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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.

(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

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Alan Dickey 5-1-96
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