

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 05-5-B14-1 -X

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

REVISION: 1 02/02/98

PART DATA

PART NAME	PART NUMBER
VENDOR NAME	VENDOR NUMBER
LRU : DATA BUS COUPLER (DBC)	MC409-0020-0001
GEC-MARCONI	A566A022-011

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 DATA BUS COUPLER (DBC)

REFERENCE DESIGNATORS:**QUANTITY OF LIKE ITEMS:**

PRE-MEDS:
 227, TWO HUNDRED TWENTY-SEVEN

MEDS CONFIGURATION:
 264, TWO HUNDRED SIXTY FOUR

FUNCTION:

PRE MEDS: (227 DATA COUPLERS)
 THE DBC PROVIDES DATA BUS ISOLATION FROM SHORTS, SIGNAL COUPLING, AND IMPEDANCE MATCHING BETWEEN THE LINE REPLACEMENT UNIT'S (LRU) AND THEIR ASSOCIATED DATA BUSES. THE DBC'S ARE ALSO USED TO PROVIDE DATA BUS TERMINATION LOADING. THERE ARE 120 DBC'S ASSIGNED TO THE GENERAL PURPOSE COMPUTERS (GPC), 38 TO THE MULTIPLEXER DEMULTIPLEXER'S (MDM), 5 TO THE DISPLAY ELECTRONICS UNIT'S (DEU), 12 TO THE DISPLAY DRIVER UNIT'S (DDU), 10 TO THE PULSE CODE MODULATOR'S (PCM), 2 TO THE MASS MEMORY UNIT'S (MMU), 8 TO THE MASTER EVENTS CONTROLLER'S (MEC), 12 TO THE ENGINE INTERFACE UNIT'S (EIU), 2 TO THE MANIPULATOR CONTROLLER INTERFACE UNIT (MCIU), 2 TO THE PAYLOAD DATA INTERLEAVER (PDI), 2 TO THE PAYLOAD SUPPORT SYSTEM (PSS), 4 TO THE DATA BUS ISOLATION AMPLIFIER'S (DBIA), 6 TO PAYLOAD FUNCTIONS, AND 4 TO THE HEADS UP DISPLAY'S (HUD).

MEDS CONFIGURATION: (264 DATA COUPLERS)
 THE DBC PROVIDES DATA BUS ISOLATION FROM SHORTS, SIGNAL COUPLING, AND IMPEDANCE MATCHING BETWEEN THE LINE REPLACEMENT UNIT'S (LRU) AND THEIR ASSOCIATED DATA BUSES. THE DBC'S ARE ALSO USED TO PROVIDE DATA BUS

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TERMINATION LOADING. THERE ARE 120 DBC'S ASSIGNED TO THE GENERAL PURPOSE COMPUTERS (GPC), 38 TO THE MULTIPLEXER DEMULTIPLEXER'S (MDM), 10 TO THE PULSE CODE MODULATOR'S (PCM), 2 TO THE MASS MEMORY UNIT'S (MMU), 8 TO THE MASTER EVENTS CONTROLLER'S (MEC), 12 TO THE ENGINE INTERFACE UNIT'S (EIU), 2 TO THE MANIPULATOR CONTROLLER INTERFACE UNIT (MCIU), 2 TO THE PAYLOAD DATA INTERLEAVER (PDI), 2 TO THE PAYLOAD SUPPORT SYSTEM (PSS), 4 TO THE DATA BUS ISOLATION AMPLIFIER'S (DBIA), 6 TO PAYLOAD FUNCTIONS, 4 TO THE HEADS UP DISPLAYS (HUD), 24 TO THE INTEGRATED DISPLAY PROCESSORS (IDP), 22 TO MULTIFUNCTION DISPLAY UNITS (MDU), AND 8 TO THE ANALOG TO DIGITAL CONVERTER(A/D).

- APPROVALS -

SS&PAE MANAGER	: P. STENGER-NGUYEN
SS&PAE	: T. AI
DESIGN ENGINEERING	: G. F. MCMULLEN
MEDS SYSTEM	: M. B. WARNER
MEDS HARDWARE	: R. SITAPARA
JSC MOD	: K. BAIN

:	<i>P. Stenger-Nguyen</i>
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FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: 05-5-B14-1-01

REVISION#: 0 04/16/96

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)

LRI: DATA BUS COUPLER (DBC)

CRITICALITY OF THIS

ITEM NAME: DATA BUS COUPLER (DBC)

FAILURE MODE: 1R2

FAILURE MODE:

OPEN, SHORT

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:

MECHANICAL FRACTURES, CONTAMINATION, VIBRATION, TEMPERATURE STRESS.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? YES

- AOA ABORT ONCE AROUND
- RTLS RETURN TO LAUNCH SITE
- TAL TRANS-ATLANTIC LANDING

REDUNDANCY SCREEN

- A) PASS
- B) PASS
- C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

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LOSS OF COMMUNICATION ON ONE PORT OF RELATED LRU. A DBC FAILURE MAY RESULT IN AN IMPEDANCE MISMATCH WHICH CAN DISRUPT NORMAL DATA BUS TRAFFIC.

(B) INTERFACING SUBSYSTEM(S):

FOR GPC, AN OPEN OF AN INTER COMPUTER COMMUNICATION (ICC) DATA BUS COUPLER (BETWEEN GPC'S) COULD RESULT IN LOSS OF THAT GPC OR CAUSE LOSS OF ENTIRE DATA BUS.

(C) MISSION:

EARLY MISSION TERMINATION MAY BE REQUIRED DUE TO DATA BUS INTERFERENCE PROBLEM.

(D) CREW, VEHICLE, AND ELEMENT(S):

POSSIBLE LOSS OF CREW/VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

CRITICALITY 1R2 BECAUSE OF THE FOLLOWING REASONS:

IF DBC IS IMPROPERLY TERMINATED, NON-UNIVERSAL I/O ERRORS CAN OCCUR CAUSING POTENTIAL LOSS OF PRIMARY AVIONICS SOFTWARE SYSTEM (PASS) REDUNDANT SET. DURING ASCENT AND ENTRY BACKUP FLIGHT SYSTEM (BFS) ENGAGE IS THEN REQUIRED. IF 2ND FAILURE IS LOSS OF BFS, LOSS OF VEHICLE/CREW WILL RESULT.

DURING INTACT ABORT (RTLs, TAL OR AOA), CRITICALITY 1 IF UNABLE TO PURGE AFT FUSELAGE COMPARTMENTS OF POST MAIN ENGINE CUTOFF (MECO) GAS MIXTURE (BY OPENING HELIUM BLOWDOWN VALVE) RESULTING IN POSSIBLE FIRE/EXPLOSION AND MAY RESULT IN LOSS OF VEHICLE/CREW ((FLIGHT AFT) FA3 OR FA4 MULTIPLEXER DEMULTIPLEXER (MDM)).

-DISPOSITION RATIONALE-

(A) DESIGN:

PARTS ARE DERATED 25% TO ORBITER PROJECT PARTS LIST (OPPL) REQUIREMENTS. THE DBC IS A PASSIVE ASSEMBLY CONSISTING OF 3 RESISTORS, ONE TOROID TRANSFORMER AND ONE CONNECTOR. IT IS A FULLY POTTED UNIT. DESIGN ALSO INCORPORATES RELIABILITY, MAINTAINABILITY, ENVIRONMENTAL AND TRANSPORTABILITY REQUIREMENTS AND OTHER DESIGN AND CONSTRUCTION PER SPECIFICATION MC409-0019.

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(B) TEST:

EACH UNIT SUBJECTED TO ACCEPTANCE TEST PROCEDURE (ATP) TEST (Y201A287Y010) AT SINGER INCLUDING EXAMINATION OF PRODUCT, INSULATION RESISTANCE TEST, DIELECTRIC STRENGTH TEST, ACCEPTANCE VIBRATION TEST (AVT), ACCEPTANCE THERMAL TEST (ATT) AND FUNCTIONAL AND PERFORMANCE TEST.

QUALIFICATION TEST (Y201A331Y101) COMPLETED AT SINGER INCLUDING ELECTROMAGNETIC COMPATIBILITY (EMC), POWER, SALT/FOG, HUMIDITY, THERMAL VACUUM, VIBRATION, LIFE, LIGHTNING, SHOCK, THERMAL CYCLING AND LIFE TESTS.

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

(C) INSPECTION:

RECEIVING INSPECTION
CERTIFICATES OF COMPLIANCE ARE IN RECEIVING INSPECTION FILES.

CONTAMINATION CONTROL
CLEAN ROOM IS MONITORED BY INSPECTION.

ASSEMBLY/INSTALLATION
POTTING PROCEDURE PER SINGER KEARFOTT INTERNAL PROCEDURE, WHICH IDENTIFIES CLEANLINESS REQUIREMENTS, IS VERIFIED BY INSPECTION. THE DATA BUS COUPLERS ARE VISUALLY INSPECTED BY BOTH SINGER KEARFOTT INSPECTION AND ROCKWELL PROCUREMENT QUALITY REPRESENTATIVE.

CRITICAL PROCESSES
SOLDERING REQUIREMENTS PER NHBS300.4(3A) ARE VERIFIED BY INSPECTION.

TESTING
ATP IS OBSERVED AND VERIFIED BY QUALITY CONTROL, INCLUDING AVT AND ATT FUNCTIONAL TESTS ARE PERFORMED PRIOR TO AND AFTER POTTING.

HANDLING/PACKAGING
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:

NONE

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- APPROVALS -

EDITORIALLY APPROVED	: RI	<u><i>Bob Crossen</i></u>
EDITORIALLY APPROVED	: JSC	<u><i>Tom Deary 5-1-96</i></u>
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: <u>96-CIL-013_05-5</u>