

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE
NUMBER: 05-6J-2229 -X

SUBSYSTEM NAME: EPD&C MAIN PROPULSION SYSTEM

REVISION: 0 **09/13/95**

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: AFT LCA 3	MC450-0059-0001
SRU	: CONTROLLER, HYBRID DRIVER	MC477-0261-0002

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

CONTROLLER, HYBRID DRIVER (HDC), TYPE 1, LEVEL OPEN SIMULATION COMMAND, POINT SENSOR ELECTRONICS BOX CHECKOUT CIRCUIT.

REFERENCE DESIGNATORS: 56V76A123J1(122)

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:

UPON GROUND MDM COMMAND, CONDUCTS MAIN BUS C POWER TO LEVEL OPEN SIMULATION COMMAND INPLT OF POINT SENSOR ELECTRONICS BOX. IN COMBINATION WITH DRY OR WET SIMULATION COMMAND, SIMULATES LO2/LH2 LEVEL DRY AND WET SIGNALS.

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: 05-6J-2729-02

REVISION#: 0 09/13/95

SUBSYSTEM NAME: EPD&C MAIN PROPULSION SYSTEM

LRU: AFT LCA 3

CRITICALITY OF THIS

ITEM NAME: CONTROLLER, HYBRID DRIVER

FAILURE MODE: 1R2

FAILURE MODE:

INADVERTENT OUTPUT, FAILS "ON", FAILS TO TURN "OFF"

MISSION PHASE: PL PRE-LAUNCH

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

CAUSE:

PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

A) PASS
 B) FAIL
 C) PASS

PASS/FAIL RATIONALE:

A)

B)

FAILS B SCREEN BECAUSE NO INSTRUMENTATION AVAILABLE TO DETECT FAILURE.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF CAPABILITY TO REMOVE OPEN SIMULATION COMMAND BY GROUND MDM.

(B) INTERFACING SUBSYSTEM(S):

DEGRADATION OF REDUNDANCY AGAINST FALSE DRY LEVEL SIGNALS.

(C) MISSION:

NO EFFECT - FIRST FAILURE.

FAILURE MODES EFFECTS ANALYSIS (FMEA) - OIL FAILURE MODE
NUMBER: 05-6J-2229-02

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT - FIRST FAILURE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

CASE I: LH2

1R/3, 2 SUCCESS PATHS AFTER FIRST FAILURE. TIME FRAME - FAST FILL

- 1) SIM OPEN HDC FAILS "ON" - NO EFFECT. LO2/LH2 LEVEL CHANNELS OPERATE NORMALLY.
- 2) SIM DRY HDC FAILS "ON", RESULTING IN FALSE DRY LEVEL SIGNALS (ALL LO2/LH2 LEVEL SENSORS).
- 3) ERRONEOUS ULLAGE PRESSURE MEASUREMENT (BACKUP TO LEVEL SENSORS FOR TERMINATING LH2 FAST FILL).

THESE FAILURES WOULD RESULT IN A RAPID TANK OVERFILL AND FLUID FLOW EXITING FROM THE ET VENT. POSSIBLE TANK DAMAGE DUE TO VIOLATION OF THE MAXIMUM STRUCTURAL REQUIREMENTS. POSSIBLE FIRE/EXPLOSION HAZARDS. POSSIBLE LOSS OF VEHICLE.

CASE II: LO2

1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE. TIME FRAME - FAST FILL

- 1) SIM OPEN HDC FAILS "ON" - NO EFFECT. LO2/LH2 LEVEL CHANNELS OPERATE NORMALLY.
- 2) SIM DRY HDC FAILS "ON", RESULTING IN FALSE DRY LEVEL SIGNALS (ALL LO2/LH2 LEVEL SENSORS).

THESE FAILURES WOULD RESULT IN A RAPID TANK OVERFILL AND FLUID FLOW EXITING FROM THE ET VENT. POSSIBLE TANK DAMAGE DUE TO VIOLATION OF THE MAXIMUM STRUCTURAL REQUIREMENTS. POSSIBLE FIRE/EXPLOSION HAZARDS. POSSIBLE LOSS OF VEHICLE.

CASE III: LO2/LH2

1R/2, 1 SUCCESS PATH AFTER FIRST FAILURE.
TIME FRAME - PROPELLANT REPLENISHING.

- 1) SIM OPEN HDC FAILS "ON" - NO EFFECT. LO2/LH2 LEVEL CHANNELS OPERATE NORMALLY.
- 2) SIM DRY HDC FAILS "ON", RESULTING IN FALSE DRY LEVEL SIGNALS (ALL LO2/LH2 LEVEL SENSORS).

THESE FAILURES WOULD RESULT IN A TANK OVERFILL AND FLUID FLOW EXITING FROM THE ET VENT. POSSIBLE TANK DAMAGE DUE TO VIOLATION OF THE MAXIMUM STRUCTURAL REQUIREMENTS. POSSIBLE FIRE/EXPLOSION HAZARDS. POSSIBLE LOSS OF CREW/VEHICLE.

-DISPOSITION RATIONALE-

(A) DESIGN:

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL FAILURE MODE
NUMBER: 05-6J-2229-02

(B) TEST:

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

GROUND TURNAROUND TEST LIQUID LEVEL SENSOR "DRY" SIMULATION CONDITION
V41AHO.030, EVERY FLIGHT,**(C) INSPECTION:**

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

(D) FAILURE HISTORY:

REFER TO APPENDIX B ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

(E) OPERATIONAL USE:

FLIGHT: N/A

GROUND: OMI S1003/S1004 (LO2/LH2 SYSTEMS) TITLED "EMERGENCY PROCEDURE FOR
MAJOR LEAK OR FIRE ..." CONTAINS SAFING SEQUENCE OF EVENTS FOR MAJOR LEAKS
IN PROPELLANT SYSTEMS.

- APPROVALS -

PAE MANAGER : D. F. MIKULA
PRODUCT ASSURANCE ENGR : M. R. MILLER
DESIGN ENGINEERING : J. L. PECK
NASA SSMA :
NASA SUBSYSTEM MANAGER :
JSC MOD :
SSE :

D.F. Mikula 9/19/95
M.R. Miller 9/19/95
J.L. Peck 9/20/95
Steve D. Callan 9-25-95
Paula LaRocca 9/22/95