

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE

NUMBER: 05-6J-2029 -X

SUBSYSTEM NAME: EPD&C MAIN PROPULSION SYSTEM

REVISION: 0 06/20/88

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: AFT LCA 1	MC450-0057-0001
LRU	: AFT LCA 2	MC450-0058 0001
LRU	: AFT LCA 3	MC450-0059-0001
SRU	: CONTROLLER, HYBRID DRIVER	MC477-0263-0002

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

CONTROLLER, HYBRID DRIVER (HDC), TYPE III, GH2 FLOW CONTROL VALVE (LV56/57/58), CLOSE SOLENOID.

REFERENCE DESIGNATORS: 54V76A121J3(84)
54V76A121J3(85)
55V76A122J3(88)
55V76A122J3(86)
56V76A123J3(86)
56V76A123J4(102)

QUANTITY OF LIKE ITEMS: 6
SIX

FUNCTION:

CONDUCTS MAIN BUS POWER TO GH2 FLOW CONTROL VALVE CLOSE SOLENOID.
TWO HDCS III ARE IN SERIES TO EACH CLOSE SOLENOID.

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: 05-6J-2029- 01

REVISION#: 1 10/17/96

SUBSYSTEM NAME: EPD&C MAIN PROPULSION SYSTEM

LRU: AFT LCA 1,2,3

CRITICALITY OF THIS

ITEM NAME: CONTROLLER, HYBRID DRIVER

FAILURE MODE: 1R2

FAILURE MODE:

LOSS OF OUTPUT, FAILS TO CONDUCT, FAILS TO TURN "ON".

MISSION PHASE: LO LIFT-OFF

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? YES

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:

LOSS OF POWER TO ONE GH2 FLOW CONTROL VALVE CLOSE SOLENOID.

(B) INTERFACING SUBSYSTEM(S):

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL FAILURE MODE

NUMBER: 05-6J-2029-01

THE GH2 FCV WILL OPEN/REMAIN OPEN

FOR NOMINAL MISSIONS, NO EFFECT. REDUNDANT GH2 FCVS WOULD COMPENSATE TO MAINTAIN ULLAGE PRESSURE.

FOR RTLS AND TAL ABORTS, AN ENGINE OUT RESULTS IN THE LOSS OF ONE FCV PRESSURIZATION LEG. A SUBSEQUENT FCV FAILING OPEN ON EITHER OF THE REMAINING OPERATING ENGINE SYSTEMS RESULTS IN VENTING OF GH2 AT LOW ALTITUDE. POSSIBLE VIOLATION OF TANK MAXIMUM STRUCTURAL CAPABILITY REQUIREMENTS. POSSIBLE FIRE/EXPLOSION HAZARD EXTERNAL TO THE VEHICLE.

FOR GH2 SYSTEM, FCV CLOSE COMMANDS ARE VERIFIED ON BY LCC FROM PRE PRESSURIZATION TO T-31 SECONDS.

(C) MISSION:

POSSIBLE LAUNCH SCRUB DUE TO LCC VIOLATION.

FOR RTLS AND TAL ABORTS, POSSIBLE LOSS OF CREW/VEHICLE.

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

SAME AS (C).

(E) FUNCTIONAL CRITICALITY EFFECTS:

1R/2. 2 PATH SCENARIO. TIME FRAME - ENGINE OPERATION

- 1) HDC FAILS TO CONDUCT CAUSING ONE GH2 FCV TO OPEN/REMAIN OPEN.
- 2) ONE OF THE FOLLOWING FAILURES ON A PARALLEL GH2 PRESSURIZATION LEG CAUSING A SECOND FCV TO OPEN/REMAIN OPEN:

- A SECOND HDC FAILS TO CONDUCT
- ET ULLAGE PRESSURE TRANSDUCER FAILURE
- LOSS OF A SIGNAL CONDITIONER
- FCV FAILS IN THE HIGH FLOW POSITION
- CONTACT-TO-CONTACT SHORT IN THE LH2 ULLAGE PRESSURE TOGGLE SWITCH INHIBIT CIRCUIT TO THE FCV CLOSE COMMAND HYBRID DRIVER

RESULTS IN EXCESSIVE GH2 ULLAGE PRESSURE CAUSING ET VENT VALVE TO RELIEVE EXCESS PRESSURE. POTENTIAL FIRE/EXPLOSION HAZARD EXTERIOR TO THE VEHICLE. POSSIBLE VIOLATION OF THE ET MAXIMUM STRUCTURAL CAPABILITY REQUIREMENTS.

POSSIBLE LOSS OF CREW/VEHICLE.

-DISPOSITION RATIONALE-

(A) DESIGN:

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

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(B) TEST:
REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER CONTROLLER.

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

(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.

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:
NO CREW ACTION CAN BE TAKEN.

- APPROVALS -

PAE MANAGER : K. L. PRESTON
PRODUCT ASSURANCE ENGR : T. K. KIMURA
DESIGN ENGINEERING : J. L. PECK
SYS DESIGN ENGINEERING : J. A. GALLARDO
NASA EPD&C SSMA :
NASA EPD&C SUBSYS MGR :
NASA SSMA :
NASA SUBSYSTEM MANAGER :
NASA MOD :

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