

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE**  
**NUMBER: 05-6G-2131 -X**

**SUBSYSTEM NAME: EPD&C - HYDRAULICS (02-6)**

**REVISION: 2      10/07/91**

---

**PART DATA**

---

	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	: AFT MCA-1	V070-785410
LRU	: AFT MCA-1	V070-785630
SRU	: CONTROLLER, HYBRID DRIVER	MC477-0263-0002

---

**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
 CONTROLLER, HYBRID DRIVER, HDC TYPE 3 - LANDING GEAR EXTEND ISOLATION VALVE

**REFERENCE DESIGNATORS:** 54V76A114(J5-F)

**QUANTITY OF LIKE ITEMS:** 1  
 ONE

**FUNCTION:**  
 WHEN COMMANDED, THE ASSOCIATED DRIVER CONNECTS BUS "A" VOLTAGE TO THE RELATED SOLENOID COIL OF THE LANDING GEAR EXTEND ISOLATION VALVE INITIATING THE "OPEN" FUNCTION.

PAGE: 5

PRINT DATE: 10/07/91

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
 NUMBER: 05-6G-2131-02

8050270H  
 ATTACHMENT  
 PAGE 166 OF

SUBSYSTEM: EPD&C - HYDRAULICS (02-6)  
 LRU :AFT MCA-1  
 ITEM NAME: CONTROLLER, HYBRID DRIVER

REVISION# 2 10/07/91 R

CRITICALITY OF THIS  
 FAILURE MODE:1R2

- FAILURE MODE:  
 INADVERTENT OUTPUT, FAILS "ON", FAILS TO TURN "OFF"

MISSION PHASE:

LO LIFT-OFF  
 OO DE-ORBIT

- VEHICLE/PAYLOAD/KIT EFFECTIVITY: 105 ENDEAVOUR 102 COLUMBIA  
 103 *Discovery*  
 104 *Atlantis*
- 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) PASS  
 ■ C) PASS

PASS/FAIL RATIONALE:

- A)  
 ■ B) VALVE HAS POSITION INDICATION  
 ■ C)

- FAILURE EFFECTS -

- (A) SUBSYSTEM:  
 PREMATURE POWER TO "OPENING" SOLENOID OF LANDING GEAR EXTEND ISOLATION VALVE.
- (B) INTERFACING SUBSYSTEM(S):  
 PREMATURE OPENING OF LANDING GEAR EXTEND ISOLATION VALVE
- (C) MISSION:  
 NO EFFECT

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE  
 NUMBER: 05-6G-2131-02

S050270H  
 ATTACHMENT -  
 PAGE 167 OF 181

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

- (E) FUNCTIONAL CRITICALITY EFFECTS:

FOR THE VALVE FAILED IN THE "OPEN" POSITION, THE SECOND FAILURE IS THE LANDING GEAR EXTEND VALVE 1 FAILING OPEN CAUSING PREMATURE DEPLOYMENT OF LANDING GEAR. POSSIBLE LOSS OF CREW/VEHICLE DUE TO (1) ET IMPACT BY LANDING GEAR DURING ASCENT OR (2) CONTROL PROBLEMS, STRUCTURAL DAMAGE AND AERO HEATING PROBLEMS DURING ENTRY. ALSO POSSIBLE LOSS OF CREW/VEHICLE WITH THREE FAILURES (THIS FAILURE, PLUS LEAK DOWNSTREAM OF VALVE, PLUS LOSS OF SECOND HYDRAULIC SYSTEM).

-----  
 - DISPOSITION RATIONALE -  
 -----

- (A) DESIGN:  
 REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

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

GROUND TURNAROUND TEST

VSBAPC.015, "BRAKE & EXTND HYD ISO VLV SWITCH VERIF" (PERFORMED PRIOR TO EACH FLIGHT OR FOR LRU REPLACEMENT). VERIFY VALVE RESPONDS TO SWITCH COMMANDS.

- (C) INSPECTION:  
 REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

- (D) FAILURE HISTORY:  
 REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

- (E) OPERATIONAL USE:  
 FIRST FAILURE - NONE. SECOND FAILURE RESULTING IN PREMATURE GEAR DEPLOY - NONE. IF OCCURS AFTER MACH 1, CREW MAY BE ABLE TO MANAGE VEHICLE ENERGY SUFFICIENTLY TO REACH THE RUNWAY.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE

NUMBER: 05-66-2131-02

S050270K

ATTACHMENT

PAGE 168 OF 180

- APPROVALS -

RELIABILITY MANAGER	:	M. C. HOVE	:	<u>Mohamed Ch. Hove</u> 10-21-91
RELIABILITY ENGINEERING	:	T. K. KIMURA	:	<u>T. Kimura</u> 10-8-91
DESIGN MANAGER	:	G. M. ANDERSON	:	<u>G.M. Anderson</u> 10-18-91
DESIGN ENGINEERING	:	G. A. FINNEMAN	:	<u>G.A. Finneman</u> 10/18/91
SUBSYSTEM MANAGER	:	B. J. VAN METER	:	<u>B.J. Van Meter</u>
QUALITY MANAGER	:	R. M. SPURLOCK	:	<u>R.M. Spurlock</u> 10/24/91
QUALITY ENGINEERING	:	W. R. HIGGINS	:	<u>W.R. Higgins</u>
NASA RELIABILITY	:		:	<u>W.R. Higgins</u> 2/3/92
NASA SUBSYSTEM MANAGER	:		:	<u>Joyce M. Serres-Cornish</u> 7/24/92
NASA EPD&C RELIABILITY	:		:	<u>M. Saleem Dindan</u> 12/3/91
NASA QUALITY ASSURANCE	:		:	<u>KO B. Dindan</u> 11/13/91
NASA EPD&C SUBSYS MGR	:		:	<u>Ed Chapman</u> 12-3-91

BUC