

## FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-6G-2056-M1-X

SOS0270H  
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SUBSYSTEM NAME: EPC&amp;C - HYDRAULICS (02-6)

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	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

## PART DATA

- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
CONTROLLER, HYBRID DRIVER, HOC TYPE 3 - HYDRAULIC SYSTEM BRAKE ISOLATION VALVE OPEN/SOLENOID DRIVER
- REFERENCE DESIGNATORS: 54V76A121AR(J11-q)  
: 55V76A122AR(J11-h)  
: 56V76A123AR(J11-f)
- QUANTITY OF LIKE ITEMS: 3  
THREE
- FUNCTION:  
WHEN COMMANDED, THE ASSOCIATED DRIVER CONNECTS BUS <sup>MAIN</sup> VOLTAGE TO THE RELATED SOLENOID COIL OF THE HYDRAULIC SYSTEM 1, 2, OR 3 BRAKE ISOLATION VALVE INITIATING THE "OPEN" FUNCTION.

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

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

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CRITICALITY OF THIS  
FAILURE MODE:1R2

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

MISSION PHASE:

LO LIFT-OFF  
DO DE-ORBIT

- VEHICLE/PAYLOAD/KIT EFFECTIVITY: 105 ENDEAVOUR 102 COLUMBIA

- CAUSE:  
PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK,  
PROCESSING ANOMALY, THERMAL STRESS

*103 Discovery*  
*104 Atlantis*

- 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 HYDRAULIC SYSTEM BRAKE ISOLATION VALVE
- (B) INTERFACING SUBSYSTEM(S):  
PREMATURE OPENING OF HYDRAULIC SYSTEM BRAKE ISOLATION VALVE PROVIDING HYDRAULIC SUPPLY TO BRAKES.

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- (C) MISSION:  
FIRST FAILURE - NO EFFECT WITHOUT SUBSEQUENT FAILURES.
- (D) CREW, VEHICLE, AND ELEMENT(S):  
FIRST FAILURE - NO EFFECT WITHOUT SUBSEQUENT FAILURES.
- (E) FUNCTIONAL CRITICALITY EFFECTS:  
POSSIBLE LOSS OF CREW/VEHICLE WITH TWO FAILURES (THIS FAILURE PLUS, FOR EXAMPLE, CHECK VALVE FAILS CLOSED) RESULTING IN UNCOMMANDED BRAKE PRESSURE (SYSTEMS 1 AND 2 ONLY). THIS RESULTS IN BLOWN TIRE IF IT IS PRESENT AT WHEEL SPIN-UP. ALSO, POSSIBLE LOSS OF CREW/VEHICLE WITH THREE FAILURES (THIS FAILURE, PLUS LEAK DOWNSTREAM OF VALVE, PLUS LOSS OF SECOND HYDRAULIC SYSTEM ((SYSTEMS 1, 2 OR 3)).

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- DISPOSITION RATIONALE -  
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- (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  
V58APO.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 UNCOMMANDED BRAKE PRESSURE - IF PRIOR TO TOUCHDOWN DURING ENTRY, SHUTDOWN APU

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## - APPROVALS -

RELIABILITY MANAGER	: M. C. HOVE	: <u>Melrose Cl. Hove</u> 10-21-91
RELIABILITY ENGINEERING	: T. K. KIMURA	: <u>T. Kimura</u> 10-2-91
DESIGN MANAGER	: G. M. ANDERSON	: <u>G.M. Anderson</u> 10-16-91
DESIGN ENGINEERING	: G. A. FINNEMAN	: <u>G.A. Finneman</u> 10/11/91
SUBSYSTEM MANAGER	: B. J. VAN METER	: <u>B.J. Van Meter</u> 10/24/91
QUALITY MANAGER	: R. M. SPURLOCK	: <u>R.M. Spurlock</u> 10/24/91
QUALITY ENGINEERING	: W. R. HIGGINS	: <u>W.R. Higgins</u> 10/24/91
NASA RELIABILITY	:	: <u>W.R. Higgins</u> 2/13/92
NASA SUBSYSTEM MANAGER	:	: <u>James M. Seibel</u> 2/4/92
NASA EPD&C RELIABILITY	:	: <u>M. Salem</u> 12/3/91
NASA QUALITY ASSURANCE	:	: <u>K.O. B. Bonten</u> 11/15/91
NASA EPD&C SUBSYS MGR	:	: <u>R. Schroyer</u> for F.A. Rouse 12-7-91