

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE****NUMBER: 05-6J-2117 -X****SUBSYSTEM NAME:** EPD&C - MAIN PROPULSION SYSTEM**REVISION:** 1 07/24/00

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	: PANEL R2	V070-730277
SRU	: SWITCH, TOGGLE	ME452-0102-7103

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**

SWITCH, TOGGLE (ONE POLE, THREE POSITIONS), HELIUM SUPPLY ISOLATION VALVE A (LV1, 3, 5)

**REFERENCE DESIGNATORS:** 32V73A2S55  
32V73A2S56  
32V73A2S57

**QUANTITY OF LIKE ITEMS:** 3**FUNCTION:**

PROVIDES MANUAL CONTROL OF POWER TO SSME HELIUM SUPPLY ISOLATION VALVE A.

**FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE**

**NUMBER: 05-6J-2117-03**

**REVISION#:** 1 11/14/2000

**SUBSYSTEM NAME:** EPD&C - MAIN PROPULSION SYSTEM

**LRU:** PANEL R2

**CRITICALITY OF THIS**

**ITEM NAME:** SSME GHE ISO VLV A TOGGLE SWITCH (LV1, 3, 5)

**FAILURE MODE:** 1R2

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**FAILURE MODE:**

FAILS OPEN, CONTACT-TO-GROUND SHORT ("CLOSE" OR "OPEN" CONTACTS)

**MISSION PHASE:** LO LIFT-OFF

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

**CAUSE:**

PIECE PART STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY.

**CRITICALITY 1/1 DURING INTACT ABORT ONLY?** NO

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**REDUNDANCY SCREEN**

- A) PASS
- B) N/A
- C) PASS

**PASS/FAIL RATIONALE:**

A)

B)

THE SWITCH CLOSE COMMAND IS STANDBY REDUNDANT TO ISOLATE A GHE LEAK DOWNSTREAM OF THE ISOLATION VALVE. THE SWITCH CLOSE CONTACT-TO-GROUND SHORT IS NOT DETECTABLE UNTIL SWITCH TRANSFERRED INTO CLOSED POSITION.

C)

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

LOSS OF SWITCH CLOSE CONTACT FUNCTION.

**(B) INTERFACING SUBSYSTEM(S):**

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LOSS OF MANUAL CAPABILITY TO CLOSE HELIUM SUPPLY ISOLATION VALVE A.

**(C) MISSION:**

FIRST FAILURE - NO EFFECT.

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

NO EFFECT - FIRST FAILURE.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

1R/2 2 SUCCESS PATHS. TIME FRAME - ASCENT.

- 1) HELIUM LEAK BETWEEN ISOLATION VALVE AND DOWNSTREAM CHECK VALVE (ASSUMES LEAK RATE IS NOT LARGE ENOUGH TO OVERPRESSURIZE AFT COMPARTMENT BEFORE CREW CAN RESPOND).
- 2) SWITCH FAILS CLOSED CONTACT-TO-GROUND SHORT. CREW WILL TRANSFER THE "A" LEG REGULATOR ISOLATION VALVE SWITCH TO CLOSE, BUT ISOLATION VALVE WILL NOT CLOSE. DUE TO LACK OF ISOLATION OF THE LEAK, THE CREW WILL RE-OPEN THE "A" SWITCH AND THEN CLOSE THE "B" REG ISOLATION VALVE SWITCH.

DUE TO THE LEAK ON THE "A" LEG, CLOSURE OF "B" LEG ISOLATION VALVE MAY RESULT IN LOSS OF HELIUM SUPPLY TO THE AFFECTED ENGINE. INTERRUPTION OF FLOW TO HIGH PRESSURE OXIDIZER TURBOPUMP INTERMEDIATE SEAL MAY RESULT IN UNCONTAINED ENGINE FAILURE PRIOR TO SAFE REDLINE SHUTDOWN.

POSSIBLE LOSS OF CREW/VEHICLE.

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**-DISPOSITION RATIONALE-**

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**(A) DESIGN:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

**(B) TEST:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

GROUND TURNAROUND TEST

ANY TURNAROUND CHECKOUT IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

**(C) INSPECTION:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

**(D) FAILURE HISTORY:**

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

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CURRENT DATA ON TEST FAILURE, FLIGHT FAILURE, 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.

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**- APPROVALS -**

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S&R ENGINEERING	: W.P. MUSTY	:/S/ W.P. MUSTY
S&R ENGINEERING ITM	: P. A. STENGER-NGUYEN	:/S/ P.A. STENGER-NGUYEN
DESIGN ENGINEERING	: ANDY RIZVI	:/S/ ANDY RIZVI
MPS SUBSYSTEM MGR.	: TIM REITH	:/S/ TIM REITH
D&C SUBSYSTEM MGR.	: LAITH COTTA	:/S/ LAITH COTTA
MOD	: JEFF MUSLER	:/S/ JEFF MUSLER
USA SAM	: MIKE SNYDER	:/S/ MIKE SNYDER
USA ORBITER ELEMENT	: SUZANNE LITTLE	:/S/ SUZANNE LITTLE
NASA SR&QA	: BILL PRINCE	:/S/ BILL PRINCE