

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 05-6-2237 -X**

**SUBSYSTEM NAME: ELECTRICAL POWER DISTRIBUTION & CONTROL
REVISION: 0 05/03/88**

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: PANEL C3A7	V070-730285
SRU	: SWITCH, TOGGLE	ME452-0102-7352

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE, LEVER LOCK, 3P2P - EXTERNAL TANK SEPARATION SELECT

REFERENCE DESIGNATORS: 35V73A3A7S3

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
PROVIDES CAPABILITY FOR CREW TO SELECT EITHER "AUTO" (GPC CONTROL) OR
"MANUAL" (CREW CONTROL) MODE FOR SEPARATION FROM THE EXTERNAL TANK.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 05-6-2237-02

REVISION#: 0 08/13/99

SUBSYSTEM NAME: ELECTRICAL POWER DISTRIBUTION & CONTROL

LRU: PANEL C3A7

CRITICALITY OF THIS

ITEM NAME: SWITCH, TOGGLE

FAILURE MODE: 1R2

FAILURE MODE:

TWO "MANUAL" POLES FAIL CLOSED, TWO OR THREE "AUTO" POLES REMAIN INTACT (CLOSED)

MISSION PHASE: LO LIFT-OFF

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	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

REDUNDANCY SCREEN	A) PASS
	B) PASS
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

PASSES "B" SCREEN BECAUSE ET SEPARATION MODE SELECT SWITCH IS INSTRUMENTED AND DISPLAYED TO GROUND FLIGHT OPERATIONS PERSONNEL AND A GPC FAULT MESSAGE "ET SEP MAN" IS DISPLAYED TO THE CREW AND GROUND. THE CREW CAN RESPOND IN A TIMELY MANNER TO RE-ENABLE AUTOMATIC ET SEPARATION.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

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FAILURE OF TWO "MANUAL" POLES TO THE CLOSED POSITION WILL RESULT IN SWITCH IN AN INDETERMINATE POSITION. SWITCH REDUNDANCY MANAGEMENT (RM) WILL DEFAULT SWITCH TO "MANUAL" ET SEPARATION POSITION

(B) INTERFACING SUBSYSTEM(S):
INHIBIT OF AUTOMATIC ET SEPARATION

(C) MISSION:
FIRST FAILURE - NO EFFECT.

(D) CREW, VEHICLE, AND ELEMENT(S):
SAME AS (C)

- (E) FUNCTIONAL CRITICALITY EFFECTS:**
1. TWO "MANUAL" POLES FAIL CLOSED, TWO OR THREE "AUTO" POLES REMAIN INTACT (CLOSED)
 2. MPS LH2 MANIFOLD PRESSURE TRANSDUCER FAILS BETWEEN 60 AND 90 PSIA

DURING ASCENT, PRIOR TO EXTERNAL TANK SEPARATION, THE ET SEPARATION SELECT SWITCH FAILS SUCH THAT THE ROLLER AND SPRING FROM ONE OF THE THREE "AUTO" POLES BREAK OFF AND CLOSE THE CONTACTS OF TWO "MANUAL" POLES. THIS WILL RESULT IN A 2 OF 3 VOTE TO THE "MANUAL" POSITION. THE 2 OF 3 VOTE FOR BOTH THE "AUTO" AND "MANUAL" POSITIONS WILL RESULT IN AN INDETERMINATE STATE. THE SWITCH REDUNDANCY MANAGEMENT (RM) WILL SEE THIS INDETERMINATE STATE AND DEFAULT TO THE "MANUAL" POSITION. THE "MANUAL" POSITION SELECTION LEADS TO AN AUTO ET SEPARATION INHIBIT AND AN "ET SEP MAN" MESSAGE WILL BE POSTED TO THE CREW. PER THE EXISTING PROCEDURE, THE CREW WILL PERFORM A KEYBOARD ENTRY USING OVERRIDE SPEC #51 ITEM 38 ENTRY TO RE-ENABLE THE AUTOMATIC ET SEPARATION. ET SEPARATION IS DELAYED BEYOND MECO +19.4 SECONDS BY THE PERFORMANCE OF THIS PROCEDURE. SHOULD THE MPS LH2 MANIFOLD PRESSURE TRANSDUCER FAIL BETWEEN 60 AND 90 PSIA PRIOR TO COMPLETION OF THIS OVERRIDE ENTRY, ET SEPARATION MAY OCCUR AT THE SAME TIME THAT THE MPS DUMP IS INITIATED. THIS MAY RESULT IN ET RE-CONTACT WITH THE VEHICLE AND LOSS OF CREW/VEHICLE.

-DISPOSITION RATIONALE-

(A) DESIGN:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

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GROUND TURNAROUND TEST
VERIFY EXTERNAL TANK SEPARATION MANUAL SWITCH POSITIONS. ACTIVATE SWITCH AND MONITOR SEPARATION "AUTO", SEPARATION "MANUAL" ENABLE, AND SEPARATION INITIATE STIMULI. TEST PERFORMED ALL FLIGHTS.

(C) INSPECTION:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

(D) FAILURE HISTORY:
REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

(E) OPERATIONAL USE:
FLIGHT CREW REQUIRED TO RE-ENABLE EXTERNAL TANK SEPARATION CAPABILITY VIA KEYBOARD ENTRY USING OVERRIDE SPEC #51 ITEM 38 ENTRY.

- APPROVALS -

SS&PA ENGINEERING	: W. MUSTY	_____
SS&PAE MANAGER	: D.F. MIKULA	_____
SUBSYSTEM MANAGER	: L. COTTA	_____
NASA MOD	: M. PATEL	_____
USA SAM	:	_____
USA ORBITER	:	_____
NASA DCE	:	_____
NASA SR&QA	:	_____

(Handwritten signature and date: 08/25/99)

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(B) TEST:
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:	<i>W.P. Musty</i>
:	<i>D.F. Mikula</i>
:	<i>L. Cotta</i>
:	<i>M. Patel</i>
:	
:	<i>Joseph R. Little</i>
:	<i>REP. SR - John Thomas</i>
:	<i>J. Harrison</i>