PRINT DATE: 04/17/96

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL HARDWARE
NUMBER: M5-6MB-2028-G -X

SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC
REVISION: 9 04/16/96

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	: PANEL R1A2	V070-730276
LRU	: PANEL A15	V070-730372
LRU	: PANEL A11A1	V070-730732
SRU	: SWITCH, TOGGLE	ME452-0102-7205

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE, 2P3P MOMENTARY - LO2 TANKS 1 THRU 9 "TEST/RESET" CONTROL

REFERENCE DESIGNATORS:
32V73A1AS10
32V73A1AS15
32V73A1AS23
36V73A11A1S3
36V73A15S6
36V73A15S15
36V73A15S20
36V73A15S25
36V73A15S30

QUANTITY OF LIKE ITEMS:
ONE PER LO2 TANK HEATER SYSTEM

FUNCTION:
PROVIDES THE CAPABILITY TO "TEST" AND "RESET" THE "TRIP AND LATCH-ON" CIRCUITRY FOR THE LO2 TANKS 1 THRU 9 HEATERS.

FAILURE MODES EFFECTS ANALYSIS FMEA – CIL FAILURE MODE
NUMBER: MS-6MB-2028-G- 03

REVISION#: 9 04/16/96
SUBSYSTEM NAME: ELECTRICAL POWER GENERATION - CRYO, GENERIC
LRU: PANEL R1A2 CRITICALITY OF THIS
ITEM NAME: SWITCH, TOGGLE FAILURE MODE: 1R3

FAILURE MODE:
FAILS CLOSED - IN "RESET" POSITION

MISSION PHASE: OO ON-ORBIT

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) FAIL
C) PASS

PASS/FAIL RATIONALE:
A)

B)
REDUNDANCY SCREEN "B" FAILS BECAUSE AFFECTED SET/RESET HYBRID DRIVER CONTROLLERS WILL BE HELD IN THEIR "RESET" STATE, AND WILL NOT BE ABLE TO CONDUCT WHEN REQUIRED DURING A CURRENT LEVEL DETECTOR TEST OR A LO2 TANK HEATER MALFUNCTION. FAILURE WILL BE DETECTED ONLY WHEN THE PERIODIC CURRENT LEVEL DETECTOR TEST IS PERFORMED.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE
NUMBER: MS-6MB-2028-G-03

LOSS OF ABILITY TO INHIBIT THE HDC'S CONTROLLING THE RPC'S PROVIDING POWER TO THE ASSOCIATED LO2 TANK HEATERS IN RESPONSE TO A CURRENT LEVEL DETECTOR TEST OR A DIFFERENTIAL CURRENT IN THE AFFECTED LO2 TANK HEATER.

(B) INTERFACING SUBSYSTEM(S):
LOSS OF LATCHING CONTROL CIRCUIT WHICH INHIBITS CONTROL HDC'S; PRECLUDES PROPER FUNCTIONING OF CURRENT LEVEL DETECTOR CIRCUIT.

(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION. AFFECTED LO2 TANK HEATER CIRCUIT CANNOT BE TESTED - AFFECTED HEATERS MUST BE TURNED OFF. LOSS OF USE OF REACTANT IN AFFECTED TANK.

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

(E) FUNCTIONAL CRITICALITY EFFECTS:
POSSIBLE LOSS OF CREW/VEHICLE DUE TO THE FOLLOWING SCENARIO: 1) SWITCH FAILS CLOSED IN THE "RESET" POSITION - CLD FUNCTION IS INHIBITED (FAILURE NOT DETECTED UNTIL PERIODIC CLD TEST IS PERFOMED), 2) LO2 TANK HEATER SHORTS THROUGH ONNE OF ITS LAYERS OF INSULATION, AND 3) SAME LO2 TANK HEATER SHORTS TO STRUTURE THROUGH ITS SECOND LAYER OF INSULATION, POSSIBLY INDUCING LOCALIZED HOT SPOTS, RESULTING IN POSSIBLE LO2 TANK RUPTURE/EXPLOSION.

-DISPOSITION RATIONALE-

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

(B) TEST:
GROUND TURNAROUND TEST
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD. THE OMRSD DATA PROVIDED BELOW IS NO LONGER BEING KEPT UP-TO-DATE. IF THERE IS ANY DISCREPANCY BETWEEN THE GROUND TESTING DATA PROVIDED BELOW AND THE OMRSD, THE OMRSD IS THE MORE ACCURATE SOURCE OF THE DATA.

SWITCH INTEGRITY IS VERIFIED IN FLIGHT DURING LO2 TANK HEATER CURRENT LEVEL SENSOR TESTS. PERFORM GROUND TURNAROUND TESTS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE
NUMBER: M5-6MB-2028-G- 03

(TANKS 1-5) WHEN VALID VERIFICATION IS UNOBTAINABLE IN FLIGHT, OR AFTER LRU REPLACEMENT.

(TANKS 6-9) PRIOR TO FIRST EDO FLIGHT, WHEN VALID VERIFICATION IS UNOBTAINABLE IN FLIGHT, OR AFTER LRU REPLACEMENT.

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

(D) FAILURE HISTORY:
CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATA BASE. THE FAILURE HISTORY DATA PROVIDED IN APPENDIX A IS NO LONGER BEING KEPT UP-TO-DATE.

(E) OPERATIONAL USE:
WHEN THE CLD FAILS ITS DAILY TEST, THE AFFECTED TANK HEATERS WILL BE DISABLED.

- APPROVALS -

PAE MANAGER	: P. STENGER-NGUYEN	:
PRODUCT ASSURANCE ENGR	: J. NGUYEN	:
DESIGN ENGINEERING	: T. NGUYEN	:
EDITORIALLY APPROVED	: JSC	:
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 96-CIL-012_M5-6MB