PRINT DATE: 03/08/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 05-6BB-2107-X

SUBSYSTEM NAME: EPO&C - BRAKE/ANTI SKID

REVISION : 2 03/08/90

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	PANEL L2A1	V070-730272
SRU	:	SWITCH, TOGGLE	ME452-0102-7201

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, TOGGLE, 2P2P, ANTI-SKID BUS

REFERENCE DESIGNATORS: 31V73A2A1S5

QUANTITY OF LIKE ITEMS: 1
ONE PER VEHICLE

FUNCTION:
MANUALLY SWITCHES ON-OFF ANTI-SKID CONTROL CIRCUIT FOR DC POWER TO ANTI-SKID BUSES FROM THE BRAKE SUB-BUSES. EACH POLE CONTROLS POWER TO ONE ANTI-SKID BUS. ONE POLE POSITION WHEN IN AN "OFF" POSITION CONTROLS ANTI-SKID-FAIL-LIGHT "ON" INDICATION.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-688-2107-01

REVISION# 2 03/08/90

SUBSYSTEM: EPD&C - BRAKE/ANTI SKID
LRU :PANEL L2A1 CRITICALITY OF THIS
ITEM NAME: SWITCH, TOGGLE FAILURE MODE:1R2

FAILURE MODE:
FAILS OPEN, SHORTS TO GROUND (ONE OR MORE POLES)

MISSION PHASE:
DO OE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: 103 DISCOVERY
: 104 ATLANTIS

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)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
FIRST FAILURE - LOSS OF ABILITY TO POWER THE ASSOCIATED ANTI-SKID BUS/BOX

(B) INTERFACING SUBSYSTEM(S):
FIRST FAILURE - LOSS OF FIFTY PERCENT OF ANTI-SKID PROTECTION FOR ALL WHEELS FOR SINGLE POLE FAILURE AND LOSS OF ONE HUNDRED PERCENT OF ANTI-SKID PROTECTION FOR TWO POLE FAILURES.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-688-2107-01

(C) MISSION:
FIRST FAILURE - NO EFFECT

(D) CREW, VEHICLE, AND ELEMENT(S):
FIRST FAILURE - LOSS OF ANTI-SKID PROTECTION WOULD ENABLE BRAKING PRIOR TO WEIGHT-ON-WHEELS. SECOND FAILURE (UNCOMMANDED BRAKE PRESSURE BEFORE MAIN WHEELS TOUCHDOWN) - WHEEL IS LOCKED-UP AT TOUCH-DOWN RESULTING IN TIRE DAMAGE AND POSSIBLE LOSS OF CREW/VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- DISPOSITION RATIONALE -

(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 - VERIFY SWITCH OPERATION BY MONITORING APPLICABLE BRAKE/SKID CONTROL MEASUREMENTS. THERE IS A TOTAL OF SIXTEEN MDM MEASUREMENTS. TESTS ARE PERFORMED PER PARAGRAPHS:
- V51AF0.010 "BRAKE/SKID ELECTRICAL INTEGRITY CHECK" (EVERY FLIGHT)
- V51AF0.011 "BRAKE/SKID POWER REDUNDANCY TEST" (EVERY FLIGHT)
AND LRU RETEST PER TABLE V51ZC0.000.

(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:
AFTER SECOND FAILURE WHERE BRAKE PRESSURE GREATER THAN 180 PSI, TIME PERMITTING, CREW WILL CLOSE HYDRAULIC LANDING GEAR ISOLATION VALVES (SYSTEM 1 AND 3 OR SYSTEM 2 AND 3). THIS ACTION ISOLATES HYDRAULIC PRESSURE FROM THE BRAKES. AFTER NOSE GEAR TOUCHDOWN, SOFTWARE COMMANDS HYDRAULIC ISOLATION VALVE #3 OPEN THEREBY RECOVERING FULL BRAKING FOR ROLLOUT.

PRINT DATE: 03/08/90

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 05-628-2107-01

- APPROVALS -

RELIABILITY ENGINEERING	T. AI	3-20-90
DESIGN ENGINEERING	Q. DANG	3/16/90
QUALITY ENGINEERING	W. R. HIGGINS	3/21/90
NASA RELIABILITY		4/24/90
NASA SUBSYSTEM MANAGER		4/24/90
NASA QUALITY ASSURANCE		4/10/90
NASA CPDC Reliability		4/24/90
NASA CPDC Subsys. Mgr.		