FAILURE MODES EFFECTS ANALYSIS (FMEA) — CIL HARDWARE
NUMBER: 05-5-817-1 -X

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)
REVISION: 7   04/16/96

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: PANEL O6	V070-730389
SRU	: SWITCH, GPC MODE	ME452-0102-7361

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
SWITCH, MODE TOGGLE, 3P3P, "RUN-STBY-HALT" LEVER LOCKED SWITCH

REFERENCE DESIGNATORS: 33V73A6S46
                           33V73A6S47
                           33V73A6S48
                           33V73A6S49
                           33V73A6S50

QUANTITY OF LIKE ITEMS: 5
FIVE ON PANEL O6

FUNCTION:
PROVIDE MEANS FOR CHANGING THE GENERAL PURPOSE COMPUTER (GPC) MODES
IN "RUN" MODE THE GPC IS IN THE OPERATIONAL STATUS. IN "STANDBY" THE GPC
ACTIVITY DEPENDS ON SOFTWARE   IN "HALT" THE GPC IS INACTIVE AND CAPABLE OF
INITIAL PROGRAM LOAD (IPL). NORMAL POSITION DURING MISSION IS "RUN".

FAILURE MODES EFFECTS ANALYSIS FMEA – CIL FAILURE MODE
NUMBER: 05-5-B17-1- 01

- REVISION#: 8 04/08/96

SUBSYSTEM NAME: DATA PROCESSING SYSTEM (DPS)
LRU: PANEL O8 **CRITICALITY OF THIS**
ITEM NAME: SWITCH, TOGGLE **FAILURE MODE: 1R2**

FAILURE MODE:
PREMATURE AND ERRONEOUS OPERATION.

MISSION PHASE: PL   PRE-LAUNCH
LO   LIFT-OFF
OO   ON-ORBIT
DO   DE-ORBIT
LS   LANDING/SAFING

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

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? YES
AOA   ABORT ONCE AROUND
RTLS   RETURN TO LAUNCH SITE
TAL   TRANS-ATLANTIC LANDING

REDUNDANCY SCREEN   A) PASS
B) FAIL
C) PASS

PASS/FAIL RATIONALE:
A)

B)
FAILS SCREEN B SINCE ONLY ONE OF THREE OF THE REDUNDANT CONTACTS IS
INSTRUMENTED

C)

- FAILURE EFFECTS -

FAILURE MODES EFFECTS ANALYSIS (FMEA) — CIL FAILURE MODE
NUMBER: 05-5-B17-1-01

(A) SUBSYSTEM:
GPC WILL BE REMOVED FROM ACTIVE USE AND PLACED IN STANDBY OR HALT.

FAILURE EFFECTS FOR EACH MODE ARE AS FOLLOWS:

1) RUN TO STANDBY:
PRIMARY AVIONICS SOFTWARE SYSTEM (PASS): GPC IS EJECTED FROM REDUNDANT
SET AND IS INEFFECTIVE UNTIL THE SET IS REFORMED.
BACKUP FLIGHT SYSTEM (BFS): GPC IS UNABLE TO CONTROL (PAYLOAD) PL1 & 2
BUSES. ABILITY TO ENGAGE BFS IS NOT AFFECTED.
2) STANDBY TO HALT:
PASS OR BFS. GPC STOPS PROCESSING.
3) HALT TO STANDBY:
BFS/PASS GPC IPL-INCOMPLETE: LOSS OF THE GPC WITH THE MODE SWITCH
PROBLEM. IPL MUST BE PERFORMED IN THE HALT MODE.

BFS/PASS GPC POST IPL: NO EFFECT. GPC IS NOW UNDER SOFTWARE CONTROL
MONITORING FOR MODE SWITCH TRANSITION TO THE RUN MODE.

BFS: NO EFFECT. HOWEVER, IF THE PASS GPC'S ARE IN OPS1 OR 3, THE BFS CAN
TRACK THE FLIGHT CRITICAL STRINGS.

WORST CASE FOR ALL MODES IS EQUIVALENT TO LOSS OF OUTPUT FROM ONE GPC.

(B) INTERFACING SUBSYSTEM(S):
LOSS OF STRINGS (DATA BUSES) ASSIGNED TO FAILED GPC.

(C) MISSION:
LOSS OF ONE GPC NO EFFECT. TWO GPC'S RESULT IN MINIMUM DURATION FLIGHT.
THREE GPC'S NEXT PRIMARY LANDING SITE.

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

(E) FUNCTIONAL CRITICALITY EFFECTS:
CRITICALITY 1R2 BECAUSE OF THE FOLLOWING REASONS:

FOR ASCENT/ENTRY: THIS FAILURE COUPLED WITH AN UNDETECTED FLIGHT CONTROL
SYSTEM (FCS) FAILURE IN THE NULL (ZERO OUTPUT) POSITION (E.G., IN THE
AEROSURFACE AMPLIFIER (ASA) OR ASCENT THRUST VECTOR CONTROLLER (ATVC)).
COULD RESULT IN THE TWO HEALTHY PATHS BEING VOTED OUT. THIS COULD RESULT
IN A VOTING DILEMMA IN THE FCS (E.G., "FORCE FIGHT" IN THE SERVO ACTUATORS.
REFERENCE FMEA 05-1-FC6042-1 AND 05-1-FC6542-1).

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 05-6-B17-1- 01

FOR ASCENT:
DURING INTACT ABORT (RTLS, TAL, AOA), CRITICALITY 1 IF UNABLE TO PURGE AFT FUSELAGE COMPARTMENTS OF POST MECO GAS MIXTURE (BY OPENING HELIUM BLOW DOWN VALVE) RESULTING IN POSSIBLE FIRE/EXPLOSION AND MAY RESULT IN LOSS OF VEHICLE & CREW ((FLIGHT AFT) FA3 OR FA4 MULTIPLEXER DEMULTIPLEXER (MDM)).

ALL PHASES:
LOSS OF OUTPUT FROM ONE INERTIAL MEASUREMENT UNIT (IMU) OR A FLIGHT FORWARD (FF) MDM CHANNEL PROCESSING IMU DATA, FOLLOWED BY FAILURE OF ANOTHER IMU OR FF MDM WITH ERRONEOUS OUTPUT SUCH THAT THE AVERAGE OF THE TWO REMAINING CHANNELS IS CORRUPTED, WILL LEAD TO INCORPORATION OF FAULTY IMU DATA BY ALL COMPUTERS AND POSSIBLE LOSS OF VEHICLE/CREW.

FOR BFS:
AFTER LOSS OF PASS DUE TO GENERIC FAILURE(S), BFS ENGAGE IS REQUIRED. ANY SUBSEQUENT FAILURE IN THE BFS LEADS TO INABILITY TO CONTROL THE VEHICLE AND RESULTS IN LOSS OF CREW/VEHICLE

-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: ALL TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(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 DATABASE

(E) OPERATIONAL USE:
AFTER FAILURE OF A PASS MODE SWITCH, THE REMAINING GPC'S SHOULD BE CONFIGURED ACCORDING TO THE APPROPRIATE FLIGHT DATA FILE GPC FAIL PROCEDURES AND FLIGHT RULE GUIDELINES.

FAILURE MODES EFFECTS ANALYSIS (FMEA) — CIL FAILURE MODE
NUMBER: 05-5-B17-1-01

- APPROVALS -		
EDITORIALLY APPROVED	: RI	
EDITORIALLY APPROVED	: JSC	
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 96-CIL-013_05-5