FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-2A-021110 -X

SUBSYSTEM NAME: FLIGHT CONTROL MECH R/SB & BF
REVISION: 0 02/02/88

PART DATA

	PART NAME / **VENDOR NAME**	**PART NUMBER** / **VENDOR NUMBER**
ASSY	: BODY FLAP ACTUATION	MC621-0056-0083
SRU	: HYDRAULIC BRAKE	

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
HYDRAULIC BRAKE

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 3
THREE

FUNCTION:
COUPLED TO ONE BODY FLAP HYDRAULIC MOTOR, THE BRAKE PREVENTS BACKDRIVING OF THE HYDRAULIC MOTOR IN THE EVENT THE MOTOR'S SUPPLY HYDRAULIC SYSTEM FAILS (I.E., PREVENTS TORQUE SPILL-OUT OF NOMINALLY OPERATING HYDRAULIC MOTOR(S) INTO INOPERATIVE HYDRAULIC MOTOR). DURING NORMAL FLIGHT CONTROL OPERATION, THE BRAKING SURFACE IS KEPT RELEASED BY THE SUPPLY HYDRAULIC SYSTEM PRESSURE WHEN SERVICE COMMANDED, AND THE BRAKE SHAFT TRANSMITS RPM/TORQUE OUTPUT FROM THE HYDRAULIC MOTOR TO THE SUMMER DIFFERENTIALS.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE
NUMBER: 02-2A-021110- 02

REVISION#: 1 08/07/98
SUBSYSTEM NAME: FLIGHT CONTROL - RUDDER SPEED BRAKE
LRU:
ITEM NAME: HYDRAULIC BRAKE
CRITICALITY OF THIS FAILURE MODE: 1R2

FAILURE MODE:
FAILS TO BRAKE

MISSION PHASE: DO DE-ORBIT

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

CAUSE:
FRACTURED ACTUATING SPRING, PRESSURE PLATE BRAKE PLATE: SHEARED BRAKE PLATE SPLINE; WORN BRAKE PLATE

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:
A)

B)
REDUNDANCY SCREEN "B" IS N/A SINCE BRAKE FAILURE IS FAILURE OF STANDBY REDUNDANCY

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
NONE AIRLOAD FORCES CAN BACKDRIVE BODY FLAP SURFACE INTO OPEN BRAKE SHAFT CAUSING AVIONICS TO CYCLE BODY FLAP SURFACE BACK TO LAST COMMANDED POSITION (LIMIT CYCLING).

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 02-2A-021110-02

(B) INTERFACING SUBSYSTEM(S):
NONE.

(C) MISSION:
NONE.

(D) CREW, VEHICLE, AND ELEMENT(S):
LOSS OF MISSION, CREW/VEHICLE AFTER TWO FAILURES - FIRST HYDRAULIC BRAKE FAILURE AND OPEN DRIVELINE IN COUPLED HYDRAULIC MOTOR. REMAINING TWO HYDRAULIC MOTOR RPM/TORQUE OUTPUTS BACKDRIVE INTO FAILED BRAKE/OPEN DRIVELINE, RESULTING IN LOSS OF BODY FLAP FUNCTION.

-DISPOSITION RATIONALE-

(A) DESIGN:
PLATE SURFACE HEAT TREATED. SPRINGS/SPLINES SIZED FOR MAXIMUM LOAD X 1.4 SAFETY FACTOR. BRAKE PLATE SURFACE ASBESTOS/CELLULOSE COMPOSITION, BONDED TO STEEL BACKING PLATES.

(B) TEST:
QUALIFICATION TESTS: PERFORMANCE, OPERATING LIFE, ULTIMATE LOAD, IMPULSE CYCLING, AND VIBRATION TESTED AT 20 TO 2,000 HZ.

ACCEPTANCE TESTS: PROOF PRESSURE, FAILURE MODE TEST, AND FUNCTIONAL TEST. TORQUE HOLDING CAPABILITY VERIFIED DURING POWER DRIVE UNIT (PDU) ACCEPTANCE TEST. BRAKE TESTING DURING ATP REQUIRES THAT EACH BRAKE FUNCTION INDIVIDUALLY.

GROUND TURNAROUND TEST
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(C) INSPECTION:
RECEIVING INSPECTION
MATERIAL AND PROCESSES CERTIFICATIONS VERIFIED BY INSPECTION INCLUDING, CHEMICAL AND MECHANICAL REQUIREMENTS.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL FAILURE MODE
NUMBER: 02-2A-021110- 02

CONTAMINATION CONTROL
CLEANLINESS AND CORROSION PROTECTION REQUIREMENTS VERIFIED BY INSPECTION

ASSEMBLY/INSTALLATION
OPERATIONS VERIFIED BY SHOP TRAVELER MIPS. DIMENSIONAL CHECKS, SURFACE FINISHES, AND TORQUES PER DRAWING REQUIREMENTS ARE VERIFIED. PISTON IS ASSEMBLED AND VERIFIED BY INSPECTION. SPRING HEIGHT AND FORCE REQUIREMENTS VERIFIED TO DRAWINGS.

NONDESTRUCTIVE EVALUATION
PENETRANT INSPECTION IS VERIFIED BY INSPECTION.

CRITICAL PROCESSES
HEAT TREATMENT, PARTS PASSIVATION, AND ANODIZING ARE VERIFIED. DRY FILM LUBRICANT, CHEMICAL FILM AND ELECTROLESS NICKEL PLATING ARE VERIFIED.

TESTING
ACCEPTANCE TEST CERTIFICATIONS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED BY INSPECTION.

(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.

(E) OPERATIONAL USE:
NONE.

- APPROVALS -

EDITORIALLY APPROVED	: BNA	: J. Kemura 8-18-98
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 95-CIL-009_02-2A