

**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	PART NUMBER
	VENDOR NAME	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- 01

REVISION#: 1 08/07/98

SUBSYSTEM NAME: FLIGHT CONTROL - RUDDER SPEED BRAKE

LRU:

CRITICALITY OF THIS
FAILURE MODE: 1/1

ITEM NAME: HYDRAULIC BRAKE

FAILURE MODE:

FAILS TO TRANSMIT RPM/TORQUE. OPEN DRIVELINE

MISSION PHASE: DO DE-ORBIT

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

CAUSE:

HYDRAULIC BRAKE INTERNAL SPLINE OR SHAFT SHEARED (MATERIAL DEFECT).

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

REMAINING TWO HYDRAULIC MOTOR RPM/TORQUE OUTPUTS BACKDRIVE INTO FAILED HYDRAULIC BRAKE/OPEN DRIVELINE, RESULTING IN LOSS OF BODY FLAP FUNCTION.

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(B) INTERFACING SUBSYSTEM(S):
NONE.

(C) MISSION:
LOSS OF MISSION, CREW/VEHICLE.

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

-DISPOSITION RATIONALE-

(A) DESIGN:
SHAFT AND SPLINES DESIGNED FOR LIMIT HOLDING TORQUE X 1.4 SAFETY FACTOR
SPLINES DESIGNED TO ANSI B 92-1. SHAFT SPLINES DESIGNED LIKE GEARS ON
ACTUATOR, WITH FATIGUE ANALYSIS SHOWING POSITIVE MARGIN OF SAFETY BASED ON
MISSION DUTY CYCLES X 4.

(B) TEST:
QUALIFICATION TESTS: POWER DRIVE UNIT (PDU) QUALIFICATION TEST - THERMAL
CYCLE (-40 DEG F TO +275 DEG F), FULL LIFE/LIMIT LOAD (400 MISSION DUTY CYCLES),
BRAKE HOLDING CAPABILITY, RANDOM VIBRATION (20- 2,000 HZ), PROOF PRESSURE (1.5
X OPERATING PRESSURE), ULTIMATE LOAD, 100,000 PRESSURE IMPULSE CYCLES (1.5 X
OPERATING PRESSURE), BURST (2.0 X OPERATING PRESSURE AT +275 DEG F)

ACCEPTANCE TESTS, PDU ACCEPTANCE TEST - PROOF PRESSURE, IMPULSE AND
THERMAL CYCLING, BRAKE TESTING DURING ACCEPTANCE TEST PROCEDURE (ATP)
REQUIRES EACH BRAKE MUST FUNCTION INDIVIDUALLY.

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

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

CONTAMINATION CONTROL
CLEANLINESS AND CORROSION PROTECTION REQUIREMENTS VERIFIED BY INSPECTION.

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ASSEMBLY/INSTALLATION

OPERATIONS VERIFIED BY SHOP TRAVELER MANDATORY INSPECTION POINTS (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. LUBRICATION VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

PENETRANT INSPECTION IS VERIFIED BY INSPECTION.

CRITICAL PROCESSES

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

TESTING

ACCEPTANCE TEST CERTIFICATION AND EXAMINATION OF PRODUCT VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING AND PACKAGING REQUIREMENTS ARE VERIFIED.

(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
TECHNICAL APPROVAL

: BNA
: VIA APPROVAL FORM

: J. Komura 8-18-98
: 95-CIL-009_02-2A