

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE
NUMBER: 02-2A-021104 -X

SUBSYSTEM NAME: FLIGHT CONTROL - RUDDER SPEED BRAKE

REVISION: 0 02/02/88

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
ASSY	: BODY FLAP ACTUATION	MC621-0056-0083
SRU	: CONTROL VALVE	

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CONTROL VALVE

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 3
THREE

FUNCTION:

THREE SPRING CENTERED SPOOL VALVES, MECHANICALLY GANGED TOGETHER AND PRESSURE ACTUATED. EACH PORT HYDRAULIC FLUID FROM ONE HYDRAULIC SYSTEM TO A BODY FLAP HYDRAULIC MOTOR/BRAKE ASSEMBLY.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 02-2A-021104- 01

REVISION#: 1 08/07/98

SUBSYSTEM NAME: FLIGHT CONTROL - RUDDER SPEED BRAKE

LRU:

**CRITICALITY OF THIS
FAILURE MODE: 1/1**

ITEM NAME: CONTROL VALVE

FAILURE MODE:

FAILED IN DRIVE OPEN/DRIVE CLOSED POSITION.

MISSION PHASE:

- LO LIFT-OFF
- DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

- *02 COLUMBIA
- 103 DISCOVERY
- 104 ATLANTIS
- 105 ENDEAVOUR

CAUSE:

CONTAMINATION. HYDRAULIC FLUID OVERTEMPERATURE. BACKED OUT LEE PLUG.

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:

LOSS OF CONTROL OF HYDRAULIC POWER TO THREE HYDRAULIC MOTOR/BRAKE ASSEMBLIES, RESULTING IN LOSS OF BODY FLAP FUNCTION.

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(B) INTERFACING SUBSYSTEM(S):
POSSIBLE BODY FLAP CONTACT WITH SPACE SHUTTLE MAIN ENGINE (SSME), OR
DAMAGE TO BODY FLAP SURFACE.

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

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

-DISPOSITION RATIONALE-

(A) DESIGN:
DESIGNED TO OPERATE AT +275 DEG F. HYDRAULIC SYSTEM 5 MICRON UPSTREAM
FILTRATION FOR REMOVAL OF POTENTIALLY JAMMING CONTAMINANTS. 500#
BREAKOUT FORCE AVAILABLE TO SHEAR CONTAMINANTS. SPOOL/SLEEVE
MANUFACTURING/MAINTAINED AS MATCHED SET WITH LABRYNTH TYPE MACHINE SEAL.
THE LEE PLUGS ARE INSTALLED TO A CLASS 2 FIT PER THE MANUFACTURER'S CATALOG
RECOMMENDATION AND THE DIFFERENTIAL PRESSURE ACROSS THE PLUG NEVER
EXCEEDS 3,000 PSID

(B) TEST:
QUALIFICATION TESTS: VIBRATION, SHOCK, THERMAL VACUUM, THERMAL CYCLE,
PERFORMANCE, OPERATING LIFE (400 MISSION DUTY CYCLES), ULTIMATE LOAD (1.5
FACTOR OF SAFETY), IMPULSE CYCLING, AND VALVE MODULE BURST PRESSURE (2.5 X
OPERATING PRESSURE). AFTER QUAL, SPOOLS REMOVED, EXAMINED, PHOTOGRAPHED
AND DIMENSIONALLY CHECKED

ACCEPTANCE TESTS: PART LEVEL ACCEPTANCE TEST PROOF PRESSURE, PROOF LOW
PRESSURE, OPERATING HINGE MOMENT AND SURFACE RATE, FAILURE MODE TEST, AND
FUNCTIONAL TESTS.

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

(C) INSPECTION:
RECEIVING INSPECTION

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MATERIALS AND PROCESSES CERTIFICATIONS VERIFIED.

CONTAMINATION CONTROL

CONTAMINATION CONTROL PROCEDURES VERIFIED. COMPLIANCE TO PROCEDURE CONFIRMED. CLEANLINESS OF INTERNALLY WETTED SURFACES TO LEVEL 190 VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

ASSEMBLY AND INSTALLATION OPERATIONS VERIFIED BY SHOP TRAVELER MANDATORY INSPECTION POINTS (MIPS) QUALIFIED/CERTIFIED PERSONNEL ARE UTILIZED. CRITICAL/CLOSE TOLERANCE DIMENSIONS AND FINISHES ARE 100 PERCENT INSPECTED FOLLOWING MACHINING.

NONDESTRUCTIVE EVALUATION

MAGNETIC PARTICLE INSPECTION VERIFIED.

CRITICAL PROCESSES

HEAT TREATING TO SPECIFICATION REQUIREMENTS VERIFIED BY INSPECTION.

TESTING

CERTIFICATIONS OF ACCEPTANCE TESTS VERIFIED.

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