

**FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL HARDWARE  
NUMBER: 02-2B-A01-FA -X**

**SUBSYSTEM NAME:** FLIGHT CONTROL MECH

**REVISION:** 0 12/04/87

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	: TVC ACTUATOR	MC621-0015
SRU	: DYNAMIC PRESSURE FEEDBACK ASSY	

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
DYNAMIC PRESSURE FEEDBACK ASSEMBLY

**REFERENCE DESIGNATORS:**

**QUANTITY OF LIKE ITEMS:** 24  
FOUR PER ACTUATOR

**FUNCTION:**  
PROVIDES AN OPPOSING DAMPING FORCE FOR FLAPPER MOVEMENT AS A FUNCTION  
OF DYNAMIC LOAD PRESSURE DIFFERENTIAL.

**FAILURE MODES EFFECTS ANALYSIS FMEA – CIL FAILURE MODE**

**NUMBER: 02-2B-A01-FA- 23**

**REVISION#: 01 08/01/96**

**SUBSYSTEM NAME: FLIGHT CONTROL - TVC ACTUATOR**

**LRU: TVC ACTUATOR**

**ITEM NAME: DYNAMIC PRESSURE FEEDBACK ASSY**

**CRITICALITY OF THIS FAILURE MODE: 1R3**

**FAILURE MODE:**

**ERRONEOUS PRESSURE FEEDBACK**

**MISSION PHASE: LO LIFT-OFF**

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

**CAUSE:**

**BROKEN SPRING, CONTAMINATION, JAMMED PISTON**

**CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO**

<b>REDUNDANCY SCREEN</b>	<b>A) PASS</b>
	<b>B) FAIL</b>
	<b>C) PASS</b>

**PASS/FAIL RATIONALE:**

**A)**

**B)**

**"B" SCREEN FAILS SINCE A METHOD OF DETECTION DOES NOT EXIST.**

**C)**

**- FAILURE EFFECTS -**

**(A) SUBSYSTEM:**

**NONE**

**(B) INTERFACING SUBSYSTEM(S):**

**NONE**

**FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE  
NUMBER: 02-2B-A01-FA- 23**

(C) MISSION:  
NONE

(D) CREW, VEHICLE, AND ELEMENT(S):  
NONE

(E) FUNCTIONAL CRITICALITY EFFECTS:  
FUNCTIONAL CRITICALITY EFFECTS-POSSIBLE LOSS OF MISSION. CREW/VEHICLE AFTER THREE UNDETECTED ITEM FAILURES, CAUSING ACTUATOR TO BECOME UNSTABLE. LOSS OF FUNCTION CAN RESULT IN LOSS OF VEHICLE CONTROL.

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**-DISPOSITION RATIONALE-**

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(A) DESIGN:  
SPOOL AND SLEEVE ARE 440C MATERIAL, HARDENED AND LAPPED FOR A MATCHED SET. SPOOL IS GROOVED TO CLEAR SILTING. DYNAMIC PRESSURE FEEDBACK ASSEMBLY HYDRAULIC FLUID IS FILTERED BY A 5 MICRON HYDRAULIC SYSTEM FILTER, AND A 15 MICRON ACTUATOR FILTER.

(B) TEST:  
QUALIFICATION: ENDURANCE CYCLING - 400 MISSION DUTY CYCLES UNDER LOAD AT MAXIMUM TEMPERATURE OF 275 DEGREES F. ACTUATOR WAS VIBRATED TO FLIGHT LEVELS AND TESTED AT -65 AND 275 DEGREES F. 100,000 PRESSURE IMPULSE CYCLES AT EACH SUPPLY AND RETURN PORT, AT 230 DEG F. SUPPLY PORTS WERE CYCLED FROM 3,000 PSIG TO 4,500 PSIG TO 1,500 PSIG, BACK TO 3,000 PSIG EACH CYCLE; RETURN PORTS, FROM 750 PSIG TO 1,500 PSIG TO 0 PSIG, BACK TO 750 PSIG. VERIFIED THAT ALL PARTS WERE WITHIN ACCEPTABLE LIMITS DURING DISASSEMBLY AND INSPECTION AT COMPLETION OF QUALIFICATION.

ACCEPTANCE: EACH DYNAMIC PRESSURE FEEDBACK ASSEMBLY IS DYNAMICALLY TESTED PRIOR TO ACTUATOR ASSEMBLY. PERFORMANCE TESTS VERIFIES FUNCTIONAL CAPABILITY OF AT LEAST TWO DYNAMIC PRESSURE FEEDBACK ASSEMBLIES. FLUID FROM ACTUATOR IS VERIFIED TO MEET CLEANLINESS LEVEL 190 PER MAO110-301.

OMRSD: ATVC FREQUENCY RESPONSE TEST, PERFORMED PRIOR TO EACH MISSION. (THIS TEST ONLY VERIFIES THAT AT LEAST TWO DYNAMIC PRESSURE ASSEMBLIES ARE FUNCTIONAL.) HYDRAULIC FLUID SAMPLES ARE TAKEN AFTER EVERY FLIGHT AND VERIFIED TO BE WITHIN SPECIFIED CLEANLINESS LEVELS.

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- APPROVALS -

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EDITORIALLY APPROVED : RI  
EDITORIALLY APPROVED : JSC  
TECHNICAL APPROVAL : VIA JSC

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:95-CIL-009