

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE**  
**NUMBER: 02-1B-044 -X**

**SUBSYSTEM NAME: LANDING/DECELERATION - BRAKE/SKID CONTROL SYS**  
**REVISION: 0 09/19/88**

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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>
	: FLIGHT CONTROLS	
LRU	: YAW-BRAKE CONTROL PEDALS	V070-573001

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**  
YAW NOSE WHEEL STEERING CONTROL PEDALS

**QUANTITY OF LIKE ITEMS: 1**  
LEFT-RIGHT ASSEMBLY

**FUNCTION:**  
THE LINKAGE SYSTEM WHOSE MOTION OPERATES THE RUDDER SURFACE CONTROL,  
AND NOSE WHEEL STEERING.

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

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**REVISION#: 0 12/20/96**

**SUBSYSTEM NAME: LANDING/DECELERATION - BRAKE/SKID CONTROL SYS**

**LRU: YAW-BRAKE CONTROL PEDALS**

**CRITICALITY OF THIS**

**ITEM NAME: YAW-BRAKE CONTROL PEDALS**

**FAILURE MODE: 1/1**

**FAILURE MODE:**

LOSS OF FUNCTION..

**MISSION PHASE: LS LANDING/SAFING**

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

**CAUSE:**

JAMMED, STRUCTURAL FAILURE, BUNGEE FAILURE, DEBRIS.

**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 RUDDER SURFACE AND NOSE WHEEL STEERING CONTROL BY THE CREW. A "JAMMED" CONDITION WOULD RESULT IN LOSS OF DIRECTIONAL CONTROL IF THE PEDALS WERE STUCK IN A POSITION OTHER THAN NEUTRAL (I.E., HARDOVER).

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

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SAME AS (A).

**(C) MISSION:**

LOSS OF DIRECTIONAL CONTROL WOULD RESULT IN POSSIBLE LOSS OF MISSION/  
CREW/VEHICLE IF ENTRY IS ATTEMPTED WITH THE PEDALS IN A HARDOVER  
CONFIGURATION.

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

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

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**-DISPOSITION RATIONALE-**

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**(A) DESIGN:**

THE LINKAGES ARE DESIGNED AND FABRICATED IN ACCORDANCE WITH THE  
APPLICABLE REQUIREMENTS OF MIL-STD-1333, MIL-A-8865, MIL-B-8584 AND AFSC DH2-2.  
A COVER IS PROVIDED IN THE LINKAGE AREA TO KEEP OUT DEBRIS.

DESIGN MINIMUM FACTOR OF SAFETY IS 1.4.

**(B) TEST:**

QUALIFICATION - 100 PERCENT LIMIT LOAD IN ACCORDANCE WITH MIL-A-8865 (ASG) 18  
MAY 1960. NO PERMANENT DEFORMATION ALLOWED. ACCEPTANCE/CHECKOUT -  
APPLICATION OF SPECIFIED FORCE VERSUS POSITION OF PEDAL ROTATIONALLY FOR  
BRAKES AND LONGITUDINALLY FOR YAW (RUDDER AND NOSE WHEEL STEERING) PER  
ML0308-0049. IN FLIGHT, THE PEDALS ARE OPERATED PRIOR TO RE-ENTRY TO ASSURE  
THAT A JAM HAS NOT OCCURED.

OMRSD: NWS DIRECT/GPC SWITCH - GPC POSITION;  
DURING THIS TEST THE PEDALS ARE USED TO ACTUATE THE NWS SYSTEM  
THROUGHOUT IT'S NORMAL RANGE OF OPERATION.

BRAKE PEDAL/HYDRAULIC DYNAMIC INSTABILITY;  
DURING THIS TEST EACH BRAKE PEDAL IS PUMPED TO 1/4, 1/2, 3/4 AND FULL STROKE  
WHILE IT'S ADJACENT PEDAL IS HELD IN THE FULLY DEPRESSED POSITION-THE  
CORRESPONDING BRAKE PRESSURES ARE VERIFIED.

**(C) INSPECTION:**  
RECEIVING INSPECTION

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MATERIAL AND PROCESS CERTIFICATIONS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL  
CORROSION PROTECTION PER MA0608-301 IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION  
ALL ASSEMBLY PARTS AND COMPONENTS ARE VERIFIED BY INSPECTION (TOOLING  
FIXTURES INCLUDED). ELECTRICAL BOND AND TEST IS VERIFIED BY INSPECTION.  
CRITICAL DIMENSIONS ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES  
INSTALLATION OF THREADED FASTENERS IS VERIFIED BY INSPECTION, INCLUDING  
TORQUING REQUIREMENTS. INSTALLATION OF BLIND FASTENERS AND RIGGING ARE  
VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION  
PENETRANT INSPECTION OF DETAIL PARTS PER MTO501-504 IS VERIFIED BY  
INSPECTION.

TESTING  
ATP IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:  
NONE.

(E) OPERATIONAL USE:  
PEDALS ARE CHECKED DURING FLIGHT CONTROL SYSTEM CHECKOUT WHICH IS DONE  
ONE DAY PRIOR TO ENTRY. SHOULD PEDALS FAIL DURING FLIGHT SYSTEMS  
CHECKOUT, CREW WOULD ATTEMPT TO CORRECT THE JAMMED CONDITION AND  
RETURN THE PEDALS TO THE NEUTRAL POSITION BEFORE DE-ORBIT.

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- APPROVALS -

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

*Robert Stoll* 12/18/96  
*Sam Scorsy*  
:96-CIL-011