

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE  
NUMBER: 02-6-A02 -X**

**SUBSYSTEM NAME: HYDRAULICS**

**REVISION: 1 07/24/88**

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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>
LRU	QUICK-DISCONNECT SYMETRICS	MC621-0024

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:**

QUICK DISCONNECT, HYDRAULIC RETURN AND PRESSURE, SELF SEALING, SSME INTERFACE

**REFERENCE DESIGNATORS:** 50V58PD1 (PRESSURE)  
50V58PD2 (RETURN)  
50V58PD3 (PRESSURE)  
50V58PD4 (RETURN)  
50V58PD5 (PRESSURE)  
50V58PD6 (RETURN)

**QUANTITY OF LIKE ITEMS: 6**

ONE HYDRAULIC RETURN QUICK DISCONNECT AND ONE HYDRAULIC PRESSURE QUICK DISCONNECT FOR EACH ENGINE

**FUNCTION:**

CONNECTS THE SSME HYDRAULIC ENGINE CONTROL ACTUATION SYSTEM TO THE ORBITER HYDRAULIC SUBSYSTEM.

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

NUMBER: 02-6-A02-01

REVISION#: 1 07/24/98

SUBSYSTEM NAME: HYDRAULICS

LRU: QUICK DISCONNECT

CRITICALITY OF THIS

ITEM NAME: QUICK DISCONNECT, HYDRAULIC RETURN

FAILURE MODE: 1/1

**FAILURE MODE:**

INADVERTENT DISCONNECT

MISSION PHASE: LO LIFT-OFF

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

**CAUSE:**

VIBRATION, IMPROPER CONNECTION

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 HYDRAULIC CONTROL OF ENGINE VALVES FOR ONE ENGINE.

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

FUEL CONTROL VALVES WILL FREE FLOAT. ENGINE CANNOT RESPOND TO SHUTDOWN COMMAND. TRAPS 3 000 PSI IN SSME VALVES. SERVOS WOULD NOT RESPOND TO

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LOCKUP COMMANDS. PNEUMATIC SHUTDOWN WOULD NOT OVERCOME TRAPPED PRESSURE TO CLOSE SSME VALVES. POTENTIAL FOR UNCONTAINED ENGINE DAMAGE.

**(C) MISSION:**

POSSIBLE LOSS OF CREW/VEHICLE IF CATASTROPHIC FUEL MIXTURE IS REACHED. (FAILURE MODE IS NOT DETECTABLE BY CREW OR GROUND. CREW MAY ATTEMPT UNDESIRABLE CORRECTIVE ACTION WHEN ATTEMPTING TO SHUT DOWN ENGINE DUE TO LACK OF INSIGHT INTO SYSTEM.)

**(D) CREW, VEHICLE, AND ELEMENT(S):**

SAME AS (C)

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**-DISPOSITION RATIONALE-**

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**(A) DESIGN:**

A REDUNDANT MECHANICAL LOCK IS INCORPORATED IN THE COUPLING ASSEMBLY TO PREVENT INADVERTENT DISCONNECTION DUE TO IMPROPER INSTALLATION. REQUIRES TWO EXTERNAL FAILURES IN THE QD BEFORE DISCONNECTION CAN OCCUR: LOSS OF NORMAL LOCK MODE MECHANISM AND LOSS OF REDUNDANT "C" RING LOCK WHICH IS LOCKWIRED. IT COULD ALSO OCCUR WITH ONE INTERNAL FAILURE: STRUCTURAL FAILURE OF LOCKING FINGERS.

**(B) TEST:**

**QUALIFICATION:**

- RANDOM VIBRATION - ACCELERATION SPECIFICATION DENSITY: INCREASING AT RATE OF 6 DB/OCT FROM 20 TO 60 HZ, CONSTANT AT 0.20 G SQ/HZ TO 150 HZ DECREASING AT RATE OF 5 DB/OCT/175 HZ, CONSTANT AT 0.15 G SQ/HZ TO 2,000 HZ. CONDUCTED WITH APPLIED 400 INCH LB SIDE LOAD. DURATION 48 MINUTE RANDOM VIBRATION ACCELERATION SPECIFICATION DENSITY INCREASING AT RATE OF 6 DB/OCT. FROM 20 TO 60 HZ, CONSTANT AT 0.025 G SQ/HZ TO 300 HZ/INCREASING AT 6 DB/OCT TO 700 HZ, CONSTANT AT 0.15 G SQ/HZ TO 2,000 HZ CONDUCTED WITH APPLIED 400 INCH LB SIDE LOAD.
- BURST TEST - DURATION 12.5 HOURS BURST PRESSURE APPLIED/PRESSURE COUPLING, 7,500 PSI/RETURN COUPLING, 4,500 PSI

**ACCEPTANCE:**

- EXAMINATION OF PRODUCT - WEIGHT, WORKMANSHIP, FINISH, DIMENSIONS, AND CONSTRUCTION
- PROOF PRESSURE TEST OF RETURN COUPLING, 3,000 PSI.

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**GROUND TURNAROUND TEST**

- ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

**(C) INSPECTION:**

**RECEIVING INSPECTION**

RAW MATERIALS ARE SENT TO A TEST LAB FOR MATERIAL/CHEMICAL ANALYSIS/ CERTIFICATION.

**CONTAMINATION CONTROL**

CLEANLINESS LEVEL 190 PER MAO110-301 IS VERIFIED BY INSPECTION.

**CRITICAL PROCESSES**

HEAT TREATMENT IS VERIFIED BY INSPECTION. SURFACE TREATMENT PROCESSES (PASSIVATION) ARE VERIFIED BY INSPECTION.

**ASSEMBLY/INSTALLATION**

SHOP TRAVELER INSPECTION IS PERFORMED ON RAW MATERIAL PRIOR TO MACHINING. CLOSE DIMENSIONAL TOLERANCES ARE VERIFIED BY INSPECTION. ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION. VISUAL INSPECTION FOR DAMAGE IS VERIFIED BY INSPECTION

**TESTING**

ATP IS VERIFIED BY RI INSPECTION.

**HANDLING/PACKAGING**

PARTS PROTECTION IS 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  
TECHNICAL APPROVAL

: BNA  
: VIA APPROVAL FORM

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