

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

SUBSYSTEM NAME: HYDRAULICS

REVISION: 1 07/24/98

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	QUICK-DISCONNECT SYMETRICS	MC621-0024

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.

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NUMBER: 02-6-A02- 02

REVISION#: 1 37/24/98

SUBSYSTEM NAME: HYDRAULICS

LRU: QUICK DISCONNECT

CRITICALITY OF THIS

ITEM NAME: QUICK DISCONNECT, HYDRAULIC PRESSURE

FAILURE MODE: 1R3

FAILURE MODE:

NADVERTENT 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? YES

RTLS RETURN TO LAUNCH SITE

REDUNDANCY SCREEN A) PASS
 B) PASS
 C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF HYDRAULIC CONTROL OF ENGINE VALVES FOR ONE ENGINE.

(B) INTERFACING SUBSYSTEM(S):

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LOSS OF HYDRAULIC CONTROL OF ENGINE VALVES FOR ONE ENGINE RESULTING IN LOSS OF ONE SSME THRUST CONTROL: HOWEVER, ENGINE VALVES WILL LOCK INTO POSITION AND ENGINE WILL CONTINUE TO OPERATE.

(C) MISSION:

ABORT DECISION

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

NONE

(E) FUNCTIONAL CRITICALITY EFFECTS:

FUNCTIONAL CRITICALITY EFFECTS-POSSIBLE LOSS OF CREW/VEHICLE WITH THREE FAILURES: THIS FAILURE, PLUS LOSS OF SECOND AND THIRD ENGINE QD'S. RESULTING IN ALL THREE ENGINES LOCKED UP AT 65 PERCENT (SHOULD FAILURES OCCUR AT MAX Q PHASE OF FLIGHT). CRITICALITY 1 FOR SSME INDUCED (FULL ENGINE OUT) RTLS.

-DISPOSITION RATIONALE-

(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.

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- 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 PRESSURE COUPLING, 4,500 PSI.

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. THE FAILURE HISTORY DATA PROVIDED BELOW IS NO
LONGER BEING KEPT UP-TO-DATE.

(AB7978-010) (1980) EXCESSIVE HYDRAULIC LEAKAGE WAS OBSERVED AT ENGINE #2
LOCATION ON THE MPTA TEST STAND AT NSTL. INVESTIGATION FOUND THE
DISCONNECT SEPARATED. FAILURE WAS CAUSED BY IMPROPER CONNECTION
(REDUNDANT "C" RING WAS NOT INSTALLED). PROCEDURES WERE CHANGED TO
INCORPORATE A LOCKWIRE OF "C" RING DURING ASSEMBLY

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(E) OPERATIONAL USE:
NONE

- APPROVALS -

EDITORIALLY APPROVED	: BNA	: <u>J. Kemura 7-30-98</u>
TECHNICAL APPROVAL	: VIA APPROVAL FORM	: 95-CIL-009_02-6