

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-6-C08 .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, SELF SEALING (MALE HALF WITH CAP, LANDING GEAR).

REFERENCE DESIGNATORS: 50V58PD27

QUANTITY OF LIKE ITEMS: 1

ONE IN POWER SYSTEM NO 1, DOWNSTREAM OF LG ISO VALVE

FUNCTION:

PROVIDE CAPABILITY FOR CONNECTING/DISCONNECTING GSE HYDRAULIC LINES TO LANDING GEAR SYSTEM WITHOUT ENTRAPPING AIR INTO OR RELEASING FLUID FROM THE HYDRAULIC SYSTEM DURING GROUND TURNAROUND OPERATIONS. CONNECTION IS TO SYSTEM NUMBER ONE ONLY FOR OPERATING LANDING GEAR.

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SUBSYSTEM NAME: HYDRAULICS
 LRU: QUICK DISCONNECT
 ITEM NAME: QUICK DISCONNECT

CRITICALITY OF THIS
 FAILURE MODE: 1R3

FAILURE MODE:
 LEAKAGE, SELF SEALING POPPET

MISSION PHASE: DO DE-ORBIT

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

CAUSE:
 DAMAGED SEAL/POPPET, CONTAMINATION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
 B) FAIL
 C) PASS

PASS/FAIL RATIONALE:

A)

"A" SCREEN IS PASS SINCE SEALING CAP CAN BE REMOVED AND POPPET CAN BE INSPECTED DURING GROUND TURNAROUND.

B)

"B" SCREEN IS FAIL SINCE SEALING CAP WOULD MASK POPPET FAILURE DURING FLIGHT.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

FIRST FAILURE - NO EFFECT. LOSS OF HYDRAULIC SYSTEM NUMBER ONE POWER AFTER TWO FAILURES (LOSS OF SEALING CAP AND LEAKAGE PAST THE SEALING POPPET).

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(B) INTERFACING SUBSYSTEM(S):

FIRST FAILURE - NO EFFECT. REDUNDANT NOSE WHEEL STEERING AND HYDRAULIC LANDING GEAR DEPLOYMENT REDUNDANT CAPABILITY LOST AFTER SECOND FAILURE. HYDRAULIC FLUID ON TPS SCREED MAY CAUSE DEGRADED TPS BONDS.

(C) MISSION:

FIRST FAILURE - NO EFFECT

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

FIRST FAILURE - NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECTS:

POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE FAILURES: LOSS OF SEALING CAP, LEAKAGE PAST THE SEALING POPPET AND LOSS OF ANOTHER HYDRAULIC SYSTEM OR LANDING GEAR PYRO DEPLOY.

-DISPOSITION RATIONALE-

(A) DESIGN:

COUPLING MATES IN A MANNER TO PREVENT CONTAMINATION FROM ENTERING SEALING SURFACES WHEN CONNECTED. CAP ACTS AS REDUNDANT SEAL TO POPPET AND IS PERFORMANCE TESTED AT SAME OPERATING PRESSURE AS POPPET.

(B) TEST:

QUALIFICATION:

- IMPULSE CYCLING TEST - 50,000 CYCLES COUPLED, 1500-4500 PSIG, 30-120 CYCLES PER MINUTE. PASS/FAIL CRITERIA: SUBSEQUENT PASSAGE OF PERFORMANCE RECORD TEST (COUPLED AND UNCOUPLED).
- SIDE LOAD TEST - 400 IN-LBS AT COUPLING INTERFACE, 3000 PSIG FOR 1 MINUTE. PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE OR PERMANENT DEFORMATION.
- THERMAL VACUUM TEST - TESTED AT -65 DEG F AND 3000 PSIG AT VACUUM; REPEATED AT 200 DEG F, 6 HOURS EACH, COUPLED AND UNCOUPLED. PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE
- THERMAL CYCLE TEST - 3000 PSIG MALE HALF WITH CAP, 2 CYCLES AT -73 DEG F TO 73 DEG F TO 275 DEG F TO 73 DEG F. PASS/FAIL CRITERIA: NO LEAKAGE DURING TEST.
- RANDOM VIBRATION - 3000 PSIG AT 135 DEG F (WITHOUT CAPS, CAPS ON TEST FIXTURE). LEVEL A FOR 12 MIN/AXIS, LEVEL B FOR 48 MIN/AXIS. LEVEL B PERFORMED

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WITH 400 IN-LBS SIDE LOAD, LEVEL C FOR 48 MIN/AXIS, LEVEL D FOR 12.5 HOURS/AXIS PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE.

- BENCH SHOCK TEST - 4 CYCLES. DROPPED 4 INCHES FROM BENCH TOP PER MIL-STD-810 PASS/FAIL CRITERIA: SUBSEQUENT PASSAGE OF PERFORMANCE RECORD TEST
- TEMPERATURE PROFILE AND ENDURANCE TEST - 3000 PSIG. -40 DEG F TO 275 DEG F TO 40 DEG F. COUPLED AND UNCOUPLED, 1000 CYCLES DURING TRANSIENT OR STEADY-STATE TEMPERATURE CONDITION PASS/FAIL CRITERIA. NO EXTERNAL LEAKAGE.
- BURST PRESSURE TEST - TESTED AT 275 DEG F, 7500 PSIG. WITH CAPS OFF. PASS/FAIL CRITERIA: NO RUPTURE.

ACCEPTANCE:

- EXAMINATION OF PRODUCT - WEIGHT, WORKMANSHIP, FINISH, DIMENSIONS AND CONSTRUCTION
- PROOF PRESSURE TEST - TESTED AT 275 DEG F AND 4500 PSIG. PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE OR PERMANENT DEFORMATION.
- PERFORMANCE RECORD TEST
 - TESTED AT 95 DEG F WITH 5, 20, AND 125 PSIG APPLIED TO MALE, FEMALE, THEN BOTH HALVES (ONE CYCLE CONSISTS OF COUPLING AND UNCOUPLING). PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE WHEN COUPLED OR UNCOUPLED.
 - PRESSURE CAP AND PLUG TEST - 5, 20, 125 PSIG. PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE.
- CLEANLINESS TEST - CLEANLINES LEVEL 190 PER MAO110-301

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.

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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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