

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-6-E02 -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) (PRESSURE AND RETURN)

REFERENCE DESIGNATORS: 50V58PD13
50V58PD14
50V58PD15
50V58PD16
50V58PD17
50V58PD18

QUANTITY OF LIKE ITEMS: 6
TWO PER POWER SYSTEM

FUNCTION:

PROVIDE CAPABILITY FOR CONNECTING/DISCONNECTING GSE HYDRAULIC LINES TO/FROM THE SUBSYSTEM WITHOUT ENTRAPPING AIR INTO OR RELEASING FLUID FROM THE HYDRAULIC SYSTEM DURING GROUND TURNAROUND OPERATIONS. ON VEHICLES OV103 AND OV104. THE PRESSURE LINE DISCONNECT IS MOUNTED ON THE FILTER MODULE (02-6-E08). ON VEHICLE OV102 THE PRESSURE LINE DISCONNECT IS MOUNTED ON THE HYDRAULIC SERVICE PANEL. IN ALL CASES. THE RETURN LINE DISCONNECTS ARE MOUNTED ON THE HYDRAULIC SERVICE PANEL.

FAILURE MODES EFFECTS ANALYSIS FMEA - CIL FAILURE MODE

NUMBER: 02-6-E02-02

REVISION#: 2 07/24/88

SUBSYSTEM NAME: HYDRAULICS

LRU: QUICK DISCONNECT

ITEM NAME: QUICK DISCONNECT

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

LEAKAGE, FLIGHT CAP

MISSION PHASE:

LO LIFT-OFF

DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102 COLUMBIA

103 DISCOVERY

104 ATLANTIS

105 ENDEAVOUR

CAUSE:

DAMAGED SEAL, CONTAMINATION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

A) FAIL

B) N/A

C) PASS

PASS/FAIL RATIONALE:

A)

"A" SCREEN IS FAILED SINCE SEALING POPPET WOULD MASK CAP FAILURE.

B)

"B" SCREEN IS "N/A" SINCE ITEM IS STANDBY REDUNDANT

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

FIRST FAILURE - NONE. LOSS OF ONE HYDRAULIC SYSTEM POWER AFTER TWO FAILURES: LOSS OF SEALING CAP AND LEAKAGE PAST THE SEALING POPPET.

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(B) INTERFACING SUBSYSTEM(S):

FIRST FAILURE - NONE. SECOND FAILURE, (FAILURE OF POPPET): LOSS OF HYDRAULIC POWER FOR ENGINE VALVE CONTROL FOR ONE ENGINE RESULTING IN LOSS OF ONE SSME THRUST CONTROL; HOWEVER, ENGINE VALVES WILL LOCK INTO POSITION AND ENGINE WILL CONTINUE TO OPERATE. LOSS OF REDUNDANT NOSE WHEEL STEERING, HYDRAULIC LANDING GEAR REDUNDANT DEPLOYMENT CAPABILITY IF SYSTEM ONE IS LOST. HYDRAULIC FLUID ON TPS SCREED MAY CAUSE DEGRADED TPS BONDS.

(C) MISSION:

NO EFFECT, FIRST FAILURE.

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

NO EFFECT, FIRST FAILURE.

(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

-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 (PRESSURE)/0-3000 PSIG (RETURN), 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 (PRESSURE)/1500 PSIG (RETURN) FOR 1 MINUTE. PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE OR PERMANENT DEFORMATION.
- THERMAL VACUUM TEST - TESTED AT -65 DEG F AND 3000 PSIG (PRESSURE)/1500 PSIG (RETURN) AT VACUUM; REPEATED AT 200 DEG F, 6 HOURS EACH, COUPLED AND UNCOUPLED. PASS/FAIL CRITERIA: NO EXTERNAL LEAKAGE

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- THERMAL CYCLE TEST - 3000 PSIG (PRESSURE)/1500 PSIG (RETURN) 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 (PRESSURE)/1500 PSIG (RETURN) 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 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 (PRESSURE)/1500 PSIG (RETURN), -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 (PRESSURE)/4500 (RETURN), 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 (PRESSURE)/3000 PSIG (RETURN). 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 - CLEANLINESS LEVEL 190 PER MAO110-301.

GROUND TURNAROUND TEST

NONE (FAILURE IS NOT GROUND DETECTABLE)

(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

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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 : BNA : J. Kemura 7-30-98
TECHNICAL APPROVAL : VIA APPROVAL FORM : 95-CIL-009_02-6