PRINT DATE: 2/25/2003
DATE/SUPERCEDING: NONE

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- HARDWARE
NUMBER: M0-AG1-E01 -X

SUBSYSTEM NAME: REMOTELY OPERATED FLUID UMBILICAL (ROFU)
REVISION: 12/08/02

PART DATA

PART NAME **VENDOR NAME**	**PART NUMBER** **VENDOR NUMBER**
:ROFU	V847-544100-001
:QUICK DISCONNECT SYMETRICS (PARKER STRATOFLEX)	MC276-0053-1001/-2001 516001-1001/-2001

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS: MC276-0053-1001 IS SOCKET, FEMALE HALF, ON ORBITER (TYPE I) MC276-0053-2001 IS NIPPLE, MALE HALF, ON PAYLOAD (TYPE II)

REFERENCE DESIGNATORS: 40P848MD1, 40P848MD2, 40P847MD1, 40P847MD2

QUANTITY OF LIKE ITEMS: 2
TWO MALE HALF QD'S. TWO FEMALE HALF QD'S

FUNCTION:
THE DISCONNECT (QD) PROVIDES THE CONNECTION BETWEEN THE ORBITER PAYLOAD BAY MOUNTED WATER COOLING SYSTEM AND THE PAYLOAD. THE QD CONSISTS OF A PAYLOAD HALF (MALE CONNECTOR) AND AN ORBITER PAYLOAD COOLING SYSTEM HALF (FEMALE). THERE ARE TWO QD'S, ONE EACH FOR COOLANT WATER SUPPLY AND RETURN. THE TWO HALVES ARE ENGAGED BY BEING PUSHED TOGETHER AND DISENGAGED BY BEING PULLED STRAIGHT BACK. THE ENGAGED QD PERMITS FLOW IN EITHER DIRECTION. THE DISENGAGED QD PROVIDES SHUTOFF CAPABILITY. COOLANT SYSTEM PRESSURE IS 300 PSIA. MAXIMUM. THE QD IS REQUIRED TO OPERATE AT ANY SYSTEM PRESSURE FROM 0 TO 300 PSIA. MATED DISCONNECTS PERMIT FLOW RATE OF 1000 LB PER HOUR OF WATER AT 300 PSIA WITH PRESSURE DROP NOT EXCEEDING 1.0 PSI. QD TRAVEL FOR FULL ENGAGEMENT IS 0.984 INCH, MAX. BOTH QD'S ARE ENGAGED OR DISENGAGED SIMULTANEOUSLY BY THE SAME MECHANISM. LINE SIZE IS 5/8 INCH DIAMETER. FLOW RATE IS 500 LB/HR, NOMINAL. THE SYSTEM IS DESIGNED FOR USE OF WATER ONLY AS ITS COOLANT. THE SYSTEM WAS TESTED WITH A PARTIAL CONTAMINATION OF FREON 21 IN CASE THERE MAY BE SOME FREON CONTAIMINATION FROM THE HEAT EXHANGER. THESE TESTS VERIFIED THAT SYSTEM INTEGRITY WOULD BE MAINTAINED WITH THIS LEVEL OF CONTAIMINATION

PRINT DATE: 2/25/2003
DATE/SUPERCEDING: NONE

FAILURE MODES EFFECTS ANALYSIS FMEA -- FAILURE MODE NUMBER: M0-AG1-E01- 02

REVISION#: 01/23/03

SUBSYSTEM NAME: REMOTELY OPERATED FLUID UMBILICAL (ROFU)
LRU: QUICK DISCONNECT
ITEM NAME: QUICK DISCONNECT

CRITICALITY OF THIS FAILURE MODE: 2/2

FAILURE MODE:
FAILS TO SEPARATE

MISSION PHASE: OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102	COLUMBIA
103	DISCOVERY
104	ATLANTIS
105	ENDEAVOUR

CAUSE:
JAMMED, BENT OR BROKEN INTERNAL PART, PARTICULATE OR FREON 21 CONTAMINATION, INSUFFICIENT SEPARATION FORCE AVAILABLE, DISLODGED O-RING

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN

A) N/A
B) N/A
C) N/A

PASS/FAIL RATIONALE:

A)
N/A

B)
N/A

C)
N/A

- FAILURE EFFECTS -

(A) SUBSYSTEM:
COOLANT LINES TO PAYLOAD CANNOT BE DISCONNECTED.

(B) INTERFACING SUBSYSTEM(S):

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- FAILURE MODE NUMBER: M0-AG1-E01- 02

PAYLOAD CANNOT BE DEPLOYED.

(C) MISSION:
LOSS OF MISSION OBJECTIVE (ISS SUPPORT). POSSIBLE CONTINGENCY EVA REQUIRED.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT ON ORBITER, CREW OR VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:
N/A

SUCCESS PATHS REMAINING AFTER FIRST FAILURE: 0

- TIME TO EFFECT -

REACTION TIME: IMMEDIATE

-DISPOSITION RATIONALE-

(A) DESIGN:
QD'S ARE NON-LATCHING AND WILL ONLY STAY MATED AS LONG AS THEY ARE HELD IN THAT POSITION.

(B) TEST:
QUALIFICATION TESTS, REF. CR NO. 60-44-544100-001, INCLUDE RANDOM VIBRATION, SHOCK, LEAKAGE, FLOW AND PRESSURE DROP, SALT FOG, SAND AND DUST, AIR INCLUSION, OPERATIONAL CYCLES AND BURST PRESSURE. A QUICK DISCONNECT EVALUATION TEST WITH FREON 21 SOLUTIONS (AT 1460 PPM FREON 21) VERIFIED THE INTEGRITY OF THE O-RING SEAL. ACCEPTANCE TESTS INCLUDE PROOF PRESSURE, OPERATIONAL CYCLES, STROKE, OVERSTROKE, ALIGNMENT, FLUID FLOW/PRESSURE DROP. SYSTEM CHECKOUT ON THE VEHICLE CAN BE PERFORMED, BUT LIMITED WHEN MPLM OR OTHER PAYLOAD WITH SIMILAR SIZE INSTALLED, USING GSE MODEL NOS. C73-0012 (ORBITER DISCONNECT SIMULATOR) AND S73-0003 (PAYLOAD DISCONNECT SIMULATOR).
GROUND TURNAROUND TEST
ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD. SYSTEM CHECKOUT IS LIMITED WHEN MINI PRESSURIZED LOGISTICS MODULE (MPLM) IS INSTALLED.

(C) INSPECTION:
RECEIVING INSPECTION
MATERIAL AND PROCESS CERTIFICATIONS ARE VERIFIED BY INSPECTION. ALL PURCHASED PARTS ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
INSPECTION VERIFIES CLEANLINESS IS MAINTAINED AND BURRS REMOVED. VISUAL INSPECTION IS PERFORMED PRIOR TO DELIVERY.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- FAILURE MODE NUMBER: M0-AG1-E01- 02

ASSEMBLY/INSTALLATION
DIMENSIONS OF DETAIL PARTS, SURFACE FINISHES, IDENTIFICATION, ASSEMBLY SEQUENCE, INSTALLATION ON SWING ARM AND PAYLOAD ASSEMBLIES ARE VERIFIED BY INSPECTION.

CRITICAL PROCESSES
HEAT TREATMENTS ARE VERIFIED BY INSPECTION.

TESTING
ACCEPTANCE TESTS OF THE QUICK DISCONNECT PER APPLICABLE PROCEDURES ARE VERIFIED BY INSPECTION PRIOR TO DELIVERY. INSPECTION ALSO VERIFIES ACCEPTANCE TESTS OF SWING ARM AND PAYLOAD DISCONNECT ASSEMBLIES WITH QUICK DISCONNECTS INSTALLED.

HANDLING / PACKAGING
HANDLING AND PACKAGING REQUIREMENTS ARE 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:
EVA CREWMEMBER COULD ATTEMPT TO MANUALLY SEPARATE THE TWO QD'S.

- APPROVALS -

S&R ENGINEER	:D. MAYNE	:/S/ D. M. MAYNE_____
CARGO/INTEG ITM.	:J. CAPALENI	:/S/ BOB DUEEASE FOR_____
DESIGN ENGINEER	:L.T. HARPER	:/S/ L. T. HARPER_____
SSM	:L. J. SALVADOR	:/S/ PHAM HOE FOR_____
NASA/DCE	:B. BROWN	:/S/ B. BROWN_____
MOD	:C. STEPHENSON	:/S/ C. STEPHENSON_____
SR&QA	:H. MALTBY	:/S/ HARRY MALTBY_____
USA/SAM	:R. SMITH	:/S/ R. SMITH_____
USA CARGO/INTG ELEMENT	:S. KUNKEL	:/S/ S. KUNKEL_____
USA ORBITER ELEMENT	S. LITTLE	:/S/ SUZANNE LITTLE_____