

PAGE: 1

PRINT DATE: 08/27/93

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL HARDWARE

NUMBER: 06-1C-0106-X

SUBSYSTEM NAME: ARS - ARPCS

REVISION: 4 08/26/93

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: QUICK DISCONNECT FAIRCHILD	MC276-0010-0310 76398000-0310

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

AUXILIARY O2 TANK FILL QD (ITEM 1.31)

REFERENCE DESIGNATORS: 40V61PD252

QUANTITY OF LIKE ITEMS: 1

FUNCTION:

PROVIDES THE ATTACHMENT POINT FOR GSE CONNECTION FOR CHECKOUT OF THE AUX O2 SYSTEM AND FOR AUX O2 TANK SERVICING.

THE LISTED FAILURE EFFECTS ARE FOR THE CASE WHEN THE AUX O2 TANK IS NOT INSTALLED. THE FAILURE EFFECTS FOR THE CASE OF THE TANK BEING INSTALLED WILL BE ADDRESSED IN THE MISSION KIT FMEA ON A MISSION BY MISSION BASIS.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE
NUMBER: 06-1C-0106-03**

REVISION# 4 08/26/93 R

SUBSYSTEM NAME: ARS - ARPCS
LRU: QUICK DISCONNECT
ITEM NAME: QUICK DISCONNECT

CRITICALITY OF THIS
FAILURE MODE: 1R2

FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE:
PL PRELAUNCH
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT
LS LANDING SAFING

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

CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:
A)

B)
THIS QD IS PART OF A STANDBY SYSTEM WHICH IS DESIGNED TO ALLOW THE
INSTALLATION OF AN AUXILIARY O2 TANK.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
NO EFFECT.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT.

(C) MISSION:
NO EFFECT.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - CRITICAL FAILURE MODE
NUMBER: 06-1C-0108-03**

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

(E) FUNCTIONAL CRITICALITY EFFECTS:
GROSS INTERNAL LEAKAGE OF THE 1.88 EMERGENCY OXYGEN SELECTOR VALVE COMBINED WITH THIS FAILURE MAY RESULT IN LOSS OF LES OXYGEN; POSSIBLE LOSS OF CREW/VEHICLE.

-DISPOSITION RATIONALE-

(A) DESIGN:

POPPET IS SPRING-LOADED CLOSED. SYSTEM PRESSURE AIDS IN SEALING POPPET, POPPET TRAVEL IS PERPENDICULAR TO LAUNCH ACCELERATION FORCES. LAPPED METAL-TO-METAL SEAT. LOCKING PRESSURE CAP PROVIDES A DUAL SEAL. 10 MICRON FILTER AT GROUND HALF COUPLING INLET. ALL COMPONENTS COMPATIBLE WITH WORKING FLUIDS. 300 SERIES CRES CONSTRUCTION.

CAP: PRESSURE-ASSISTED TEFLON SEAL IS REPLACED PRIOR TO EVERY CAP INSTALLATION. POSITIVE LOCKING DESIGN. BODY IS CONSTRUCTED OF A 300 SERIES CRES. ALL MATERIALS ARE COMPATIBLE WITH WORKING FLUIDS.

(B) TEST:

QUALIFICATION TESTS INCLUDED: MECHANICAL SHOCK (20 G IN 2 AXES WITH UNIT PRESSURIZED TO 3300 PSIG).
SINUSOIDAL VIBRATION FROM 5 TO 35 HZ (AT +/- 0.25 G PEAK IN TWO AXES WITH UNIT PRESSURIZED TO 3300 PSIG).
RANDOM VIBRATION +6 DB/OCT FROM 20-90 HZ, 1.0 G SQ/HZ CONSTANT FROM 90 TO 300 HZ, -6 DB/OCT FROM 300 TO 2000 HZ (FOR 34 MINUTES / EACH OF 2 AXES) AND +6 DB/OCT FROM 20-40 HZ, 0.5 G SQ/HZ CONSTANT FROM 40 TO 150 HZ, AND -6 DB/OCT FROM 150 TO 2000 HZ (FOR 14 MINUTES / EACH OF TWO AXES).
THERMAL CYCLES: 6 CYCLES WHILE PRESSURIZED TO 3300 PSIG FROM AMBIENT TO -150F (HELD FOR 30 MINUTES); -150F TO +18F (HELD FOR 6 HOURS); +18F TO 350F (HELD FOR 30 MINUTES).
LOW TEMPERATURE THERMAL CYCLES: 5 CYCLES WHILE PRESSURIZED TO 3300 PSIG FROM AMBIENT TO -150F, ACTUATED OPEN/CLOSE 5 CYCLES. HIGH TEMPERATURE THERMAL CYCLES: ONCE, WHILE PRESSURIZED TO 3300 PSIG; INCREASE FROM -150F TO +150F (HELD FOR 30 MINUTES).
MATING OPERATION: 400 CYCLES WHILE PRESSURIZED TO 3300 PSIG, 100 CYCLES UNPRESSURIZED.
OPERATING LIFE: 4000 CYCLES PRESSURIZED TO 3300 PSIG. BURST PRESSURE TEST: 6600 PSIG WITHOUT RUPTURE OR SEPARATION.

ACCEPTANCE TEST: PROOF PRESSURE TEST AT 5000 PSIG FOR 5 MINUTES. MAXIMUM ALLOWED INTERNAL LEAK RATE IS 2.7 SCCS GHE UNCAPPED, 0.005 SCCS CAPPED AT 3300-3400 PSIG. MAXIMUM ALLOWABLE EXTERNAL LEAK RATE IS 1.0 SCCS GHE.

OMRSD: 3300 PSI O2 SYSTEM MANIFOLD LEAK TEST WAS PERFORMED PRIOR TO THE FIRST REFLIGHT OF EACH VEHICLE AND WOULD BE PERFORMED UPON LRU REPLACEMENT OR O2 TANK INSTALLATION.

(C) INSPECTION:

RECEIVING INSPECTION

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TEST REPORTS AND MATERIALS CERTIFICATIONS ARE MAINTAINED CERTIFYING MATERIALS AND PHYSICAL PROPERTIES.

CONTAMINATION CONTROL

ALL INTERNAL PARTS AND INTERNAL SURFACES OF THE DISCONNECT SHALL BE CLEANED TO LEVEL 200A OF MA0110-301. CORROSION PROTECTION AND COMPLIANCE WITH THE CONTAMINATION CONTROL PLAN ARE VERIFIED. -

ASSEMBLY/INSTALLATION

DISCONNECT BODY ORIFICE, POPPET STEM DIAMETERS, AND OTHER CRITICAL DIMENSIONS ARE VERIFIED BY INSPECTION. TORQUES AND SURFACE FINISH ARE VERIFIED. QD AND CAP MANUFACTURING PROCESSES, ASSEMBLY AND INSTALLATION REQUIREMENTS ARE VERIFIED BY INSPECTION. LOG OF CLEAN ROOM AND TOOL CALIBRATION ARE VERIFIED. SEALS ARE VISUALLY EXAMINED PRIOR TO INSTALLATION FOR DAMAGE AND CLEANLINESS. ALL CLEANED SUBASSEMBLIES SHALL BE HANDLED IN A CLASS 100,000 CLEAN ROOM AS DEFINED IN FED-STD-209.

CRITICAL PROCESSES

PARTS PASSIVATION, ALL WELDS AND APPLICATION OF DRY-LUBE ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE TESTING

WELDS ARE FLUORESCENT PENETRANT INSPECTED, USING LOX COMPATIBLE PENETRANT MATERIAL.

TESTING

QD AND CAP EXTERNAL LEAKAGE IS VERIFIED DURING ATP.

HANDLING/PACKAGING

PACKAGING FOR SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:

A SIMILAR QUICK DISCONNECT (MC276-0010-0380) EXHIBITED EXTERNAL LEAKAGE. THE CAUSE WAS AN IMPROPER WELD. THE ATP WAS REVISED TO INCLUDE A LEAK CHECK ON THE DYNATUBE/HOUSING INTERFACE (AC2842).

(E) OPERATIONAL USE:

NONE

- APPROVALS -

EDITORIALLY APPROVED : RI
EDITORIALLY APPROVED : JSC
TECHNICAL APPROVAL : VIA CR

Handwritten signatures and dates:
: [Signature] 8/27/93
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: 5502500