FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 06-1A-1603-X

SUBSYSTEM NAME: ARS - AIRLOCK
REVISION : 2 06/15/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	EQUALIZATION VALVE CAP CARLETON TECHNOLOGIES	MC250-0004-0009 2763-3001-7

PART DATA

■ EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CAP, EQUALIZATION VALVE, CABIN/AIRLOCK

QUANTITY OF LIKE ITEMS: 2
TWO ON INNER HATCH

FUNCTION:
CONNECTS TO THE EQUALIZATION VALVE TO LIMIT INTERNAL LEAKAGE THROUGH THE VALVE. CAP CAN BE REMOVED BY THE CREW AND IS TETHERED TO VALVE ASSEMBLY. CAP HAS A 0.180 DIAMETER HOLE TO PROVIDE OVERPRESSURIZATION PROTECTION FOR THE AIRLOCK DURING LAUNCH AND ENTRY.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 06-1A-1603-01

REVISION# 2 06/15/90 R

SUBSYSTEM: ARS - AIRLOCK
LRU :EQUALIZATION VALVE CAP
ITEM NAME: EQUALIZATION VALVE CAP

CRITICALITY OF THIS FAILURE MODE:1R2

FAILURE MODE:
INABILITY TO MATE

MISSION PHASE:
OO ON-ORBIT

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

CAUSE:
CONTAMINATION, CORROSION, PHYSICAL BINDING/JAMMING, MECHANICAL SHOCK

■ CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
CAP COULD NOT BE INSTALLED TO LIMIT INTERNAL LEAKAGE THROUGH VALVE.

(B) INTERFACING SUBSYSTEM(S):
SAME AS A.

(C) MISSION:
NO EFFECT.

(D) CREW, VEHICLE, AND ELEMENT(S):
SECOND ASSOCIATED FAILURE (VALVE INTERNAL LEAKAGE) CAN CAUSE LOSS OF

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EMERGENCY EVA CAPABILITY AND CAN RESULT IN LOSS OF CREW/VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- DISPOSITION RATIONALE -

(A) DESIGN:
CAP IS FABRICATED FROM 6061-T6 ALUMINUM. CAP IS THREADED TO MATE WITH VALVE AND IS SEALED BY A SILICONE RUBBER O-RING SEAL ON VALVE.

■ (B) TEST:
QUALIFICATION TESTS FOR 100 MISSION LIFE: CAP IS INSTALLED ON VALVE FOR VALVE QUALIFICATION TEST. ACCELERATION OF +/- 5 G PER AXIS FOR 5 MINUTES. SINUSOIDAL VIBRATION 5 TO 35 HZ AT 0.25 G PEAK PER AXIS. RANDOM VIBRATION - 0.09 G**2/HZ. DESIGN SHOCK - 20 G TERMINAL SAWTOOTH PULSE OF 11 MILLISECONDS DURATION IN EACH DIRECTION OF THE THREE ORTHOGONAL AXES.

OMRSD - CAP O-RING AND SEALING SURFACES ARE INSPECTED PRIOR TO EACH INSTALLATION OF CAP ONTO QD.

■ (C) INSPECTION:
RECEIVING INSPECTION
MATERIAL VERIFIED BY PHYSICAL-CHEMICAL REPORTS AT RECEIVING INSPECTION.

CONTAMINATION CONTROL
CORROSION PROTECTION REQUIREMENTS VERIFIED BY INSPECTION. CLEANLINESS LEVEL OF 200A AND 100 ML RINSE TESTS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING PROCESSES, INSTALLATION AND ASSEMBLY VERIFIED BY INSPECTION. DIMENSIONAL CHECKS VERIFIED BY INSPECTION. SEAL INSPECTION AND INSTALLATION VERIFIED BY INSPECTION.

CRITICAL PROCESSES
SPECIAL TEFLON IMPREGNATED ANODIZATION (NITUFF) VERIFIED BY INSPECTION. SEAL MOLDING VERIFIED BY INSPECTION, INCLUDING DUROMETER HARDNESS TEST TO VERIFY CURE.

TESTING
ATP VERIFIED BY INSPECTION.
VISUALLY INSPECTED AND MATED PRIOR TO EACH FLIGHT.

HANDLING/PACKAGING
PARTS PROTECTION VERIFIED BY INSPECTION.

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(D) FAILURE HISTORY:
NO FAILURE HISTORY.

(E) OPERATIONAL USE:
IF CAP CANNOT BE MATED THE CREWMAN WILL CLOSE THE EQUALIZATION VALVE.

- APPROVALS -

RELIABILITY ENGINEERING	D. R. RISING	
DESIGN ENGINEERING	K. KELLY	
QUALITY ENGINEERING	M. SAVALA	
NASA RELIABILITY		
NASA SUBSYSTEM MANAGER		
NASA QUALITY ASSURANCE		