FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: 06-1A-1124-X

SUBSYSTEM NAME: ARS - AIRLOCK
REVISION : 2 09/21/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	PRESSURE CAP CARLETON TECHNOLOGIES	MC250-0004-0010 2763-2001-7

PART DATA

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

QUANTITY OF LIKE ITEMS: 2
ONE PER VALVE; TWO PER HATCH

FUNCTION:
ATTACHES TO THE EQUALIZATION VALVE TO PREVENT INTERNAL LEAKAGE THROUGH THE VALVE. CAN BE REMOVED BY A CREWMAN IN A PRESSURE GARMENT ASSEMBLY AND IS TETHERED TO PREVENT MOVEMENT AWAY FROM THE VALVE ASSEMBLY.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: 06-1A-1124-03

REVISION# 2 09/21/90 R

SUBSYSTEM: ARS - AIRLOCK
LRU :PRESSURE CAP
ITEM NAME: PRESSURE CAP

CRITICALITY OF THIS FAILURE MODE: 1R2

FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE:
OO ON-ORBIT

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) FAIL
C) PASS

PASS/FAIL RATIONALE:
A)

B)
SCREEN B FAILS BECAUSE THE CAP IS THE FIRST SEALING COMPONENT AND ITS FAILURE IS NOT DETECTABLE.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF REDUNDANT SEAL TO EQUALIZATION VALVE.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT - VALVE PROVIDES REDUNDANT SEAL.

(C) MISSION:
NO EFFECT.

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(D) CREW, VEHICLE, AND ELEMENT(S):
SECOND ASSOCIATED FAILURE (VALVE INTERNAL LEAKAGE) MAY CAUSE LOSS OF EMERGENCY EVA CAPABILITY AND POSSIBLE LOSS OF EVA CREWMAN.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- DISPOSITION RATIONALE -

(A) DESIGN:
CAP IS FABRICATED FROM 6061-T6 ALUMINUM. THE 0.180 INCH DIAMETER BLEED HOLE HAS A SPRING-LOADED SILICONE RUBBER SEAL. CAP IS THREADED TO MATE WITH VALVE AND IS SEALED BY A SILICONE RUBBER O-RING SEAL ON VALVE.

(B) TEST:
QUALIFICATION TEST FOR 100 MISSION LIFE: CAP IS INSTALLED ON VALVE FOR VALVE QUAL TEST. ACCELERATION OF 5 G FOR 5 MINUTES PER AXIS. SINUSOIDAL VIBRATION - 5 TO 35 HZ AT .25 G PEAK PER AXIS. RANDOM VIBRATION - 0.09 G**2/HZ FOR 48 MINUTES PER AXIS. DESIGN SHOCK - 20 G PER AXIS. THERMAL VACUUM/THERMAL CYCLE - WITH VALVE CLOSED AND CAP ON, UNIT EXPOSED TO 120 TO 130 F AND VACUUM OF 1 X 10 EXP -6 TORR FOR 24 HOURS. LOW/HIGH TEMP CYCLE - HELD AT -40 TO -50 F FOR 3 HOURS AND AT +120 TO +130 F FOR 3 HOURS.

ACCEPTANCE TEST - PROOF PRESSURE 25 PSIG GN2. EXTERNAL LEAKAGE 14 - 16 PSIG, 5.0 SCCM MAX LEAKAGE, WITH VALVE OPEN AND CAP INSTALLED.

IN-VEHICLE TESTING - 3.2 PSID CABIN LEAK TEST.

OMRSD - GROSS LEAKAGE TEST AT 2 PSID BEFORE EACH FLIGHT VERIFIES NO GROSS LEAKAGE THROUGH BOTH VALVE AND CAP SIMULTANEOUSLY. CAPS AND O-RINGS ARE INSPECTED FOR DAMAGE PRIOR TO INSTALLATION.

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

CONTAMINATION CONTROL
CORROSION PROTECTION REQUIREMENTS VERIFIED BY INSPECTION. CLEANLINESS LEVELS 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.

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

TESTING
ATP VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PARTS PROTECTION VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
NO FAILURES.

(E) OPERATIONAL USE:
NO CREW ACTION REQUIRED FOR FIRST FAILURE.

- APPROVALS -

RELIABILITY ENGINEERING	D. R. RISING	DRR
DESIGN ENGINEERING	K. KELLY	
QUALITY ENGINEERING	M. SAVALA	9/27/90
NASA RELIABILITY		11/14/90
NASA SUBSYSTEM MANAGER		11/14/90
NASA QUALITY ASSURANCE		