

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER: M8-1SS-E032 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 0 04/08/97

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:CAP, PRESSURE CARELTON TECHNOLOGIES	MC250-0004-0011 2765-0018-5

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
EXTERNAL AIRLOCK MANUAL DEPRESS VALVE PRESSURE CAP

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
 CAPS ONTO EXTERNAL AIRLOCK MANUAL DEPRESSURIZATION VALVE TO PROVIDE SECONDARY PROTECTION FOR INTERNAL LEAKAGE THROUGH THE VALVE. CAN BE REMOVED BY CREW IN A PRESSURE GARMENT ASSEMBLY AND IS TETHERED TO PREVENT MOVEMENT AWAY FROM THE VALVE ASSEMBLY.

REFERENCE DOCUMENTS: VS28-643001
 V828-643050

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: M8-1SS-E032-01

REVISION#: 0 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS

LRU: CAP, DEPRESSURIZATION VALVE PRESSURE

CRITICALITY OF THIS

ITEM NAME: CAP, DEPRESSURIZATION VALVE PRESSURE

FAILURE MODE: 1R3

FAILURE MODE:

INABILITY TO MATE

MISSION PHASE: OO ON-ORBIT

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

CAUSE:

CONTAMINATION, PHYSICAL BINDING/JAMMING, CORROSION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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

PASS/FAIL RATIONALE:

A)

B)

N/A - ALL REDUNDANCY IS IN STANDBY UNTIL UTILIZED.

C)

METHOD OF FAULT DETECTION:

PHYSICAL OBSERVATION - CREW UNABLE TO PHYSICALLY MATE PRESSURE CAP ON EXTERNAL AIRLOCK MANUAL DEPRESS VALVE.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:

NO CREW ACTION REQUIRED UNTIL VALVE INTERNALLY LEAKS. CREW COULD THEN UTILIZE EXTERNAL AIRLOCK AFT HATCH EQUALIZATION VALVES FOR FUTURE VENTING.

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DURING IVA - CREW COULD: (1) HOLD CAP AGAINST THE DEPRESS VALVE TO ALLOW A DELTA-PRESSURE ACROSS CAP TO KEEP IN IN PLACE; (2) USE ANY AVAILABLE MATERIAL, INCLUDING DUCT TAPE, TO SEAL LEAK; OR (3) ISOLATE EXTERNAL LEAKAGE OF PRESSURE FROM CREW CABIN BY CLOSING 576 BULKHEAD HATCH.

DURING EVA - CREW COULD: (1) HOLD CAP AGAINST THE DEPRESS VALVE TO ALLOW A DELTA-PRESSURE ACROSS CAP TO KEEP IN IN PLACE; OR (2) USE ANY AVAILABLE MATERIAL, INCLUDING DUCT TAPE, TO SEAL LEAK.

REMARKS/RECOMMENDATIONS:

SECONDARY SEAL PROVIDED BY PRESSURE CAP. PRIMARY SEAL PROVIDED BY MANUAL DEPRESS VALVE. THIS FAILURE MODE ASSUMES THAT NO OTHER CAPS CAN BE, NOMINALLY, MATED TO THE SAME MANUAL DEPRESS VALVE.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF SECONDARY SEAL TO EXTERNAL AIRLOCK MANUAL DEPRESS VALVE.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT. DEPRESS VALVE PROVIDES PRIMARY SEAL. LOSS OF ISOLATION BETWEEN EXTERNAL AIRLOCK AND OUTSIDE ATMOSPHERE FOLLOWING INTERNAL LEAKAGE OF ASSOCIATED DEPRESS VALVE. THEN EXTERNAL LEAKAGE OF PRESSURE WOULD RESULT IN EXCESSIVE USE OF CONSUMABLES.

(C) MISSION:

LOSS OF MISSION OBJECTIVES IF SECOND ASSOCIATED FAILURE (INTERNAL LEAKAGE OF DEPRESS VALVE) OCCURS PRIOR TO DOCKING OR PRIOR TO COMPLETION OF IVA. LOSS OF CAPABILITY TO PERFORM PLANNED EVA DUE TO INABILITY TO REPRESSURIZE THE ODS VOLUME FOR CREWS RETURN TO THE CREW MODULE.

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

LOSS OF CREW/VEHICLE IF SECOND ASSOCIATED FAILURE (INTERNAL LEAKAGE OF DEPRESS VALVE) OCCURS AND ODS PRESSURE CANNOT BE MAINTAINED.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE (INABILITY TO MATE PRESSURE CAP) - NO EFFECT. LOSS OF SECONDARY SEAL ONLY.

SECOND ASSOCIATED FAILURE (MANUAL DEPRESS VALVE INTERNAL LEAKAGE), IF OCCURS:

DURING EVA:

- INABILITY TO REPRESSURIZE EXTERNAL AIRLOCK FOR EVA CREWMEMBER'S RETURN TO CREW CABIN - CRITICALITY 1R2 CONDITION.

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
NUMBER: M8-1SS-E032-01****DURING IVA:**

EXTERNAL LEAKAGE OF HABITABLE PRESSURE RESULTING IN AN INCREASED USE OF CONSUMABLES. - CRITICALITY 1R2 CONDITION.

IF SECOND FAILURE OCCURS WHEN EXTERNAL AIRLOCK UPPER HATCH IS OPEN:
POSSIBLE LOSS OF PRESSURE IN SPACE STATION.

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 1R2

(F) RATIONALE FOR CRITICALITY DOWNGRADE:**DURING IVA:**

THIRD FAILURE (UNABLE TO HOLD CAP AGAINST VALVE INLET TO ALLOW DELTA-P TO KEEP CAP IN PLACE) - CONTINUOUS INCREASE USE OF CONSUMABLES WITHIN ODS.

FOURTH FAILURE (INABILITY TO SEAL LEAK) - CONTINUOUS INCREASE USE OF CONSUMABLES WITHIN ODS.

FIFTH FAILURE (INABILITY TO CLOSE 576 BULKHEAD HATCH) - LOSS OF CAPABILITY TO ISOLATE EXTERNAL LEAKAGE OF HABITABLE PRESSURE FROM CREW CABIN.

INCREASED USE OF CONSUMABLES WITHIN CREW CABIN COULD JEOPARDIZE SAFETY OF CREW AND VEHICLE. - CRITICALITY 1R3 CONDITION.

DURING EVA:

THIRD FAILURE (UNABLE TO HOLD CAP AGAINST VALVE INLET TO ALLOW DELTA-P TO KEEP CAP IN PLACE) - INABILITY OF EXTERNAL AIRLOCK TO HOLD PRESSURE.

FOURTH FAILURE (INABILITY TO SEAL LEAK) - POSSIBLE LOSS OF CREWMEMBERS IF EXTERNAL AIRLOCK VOLUME CANNOT BE REPRESSURIZED FOR CREW RETURN TO CREW CABIN. (EVA CREWMEMBERS MUST REMAIN IN AIRLOCK UNTIL LANDING.) - CRITICALITY 1R3 CONDITION.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: IMMEDIATE

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: SECONDS

**IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?
YES**

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:

CREW WOULD HAVE ENOUGH TIME TO SEAL LEAKAGE BY PERFORMING AN IN-FLIGHT MAINTENANCE OR ISOLATE EXTERNAL LEAKAGE OF HABITABLE PRESSURE BY CLOSING THE 576 BULKHEAD HATCH BEFORE THE PROBLEM BECAME CATASTROPHIC.

HAZARD REPORT NUMBER(S): ORBI 511, ORBI 162

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HAZARD(S) DESCRIPTION:

LOSS OF HABITABLE PRESSURE IN CREW CABIN HABITABLE VOLUME (ORBI 511),
INABILITY TO RETURN FROM EVA DUE TO AIRLOCK HATCH FAILURES AND / OR
REPRESSURIZATION OF THE AIRLOCK (ORBI 162).

- APPROVALS -

SS & PAE
DESIGN ENGINEER

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: K. J. KELLY

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