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 VENDOR NAME	PART NUMBER 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
VB28-643050

FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE
NUMBER: M8-1SS-E032-02

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:
LEAKAGE

MISSION PHASE: OO ON-ORBIT

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

CAUSE:
MATERIAL DEFECT, FATIGUE, 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 - BECAUSE THE MANUAL DEPRESS VALVE IS THE PRIMARY SEALING COMPONENT AND THE CAP IS STANDBY REDUNDANCY IN PREVENTING INTERNAL LEAKAGE.

C)

METHOD OF FAULT DETECTION:
A CRACKED PRESSURE CAP COULD BE VISUALLY DETECTED AT TIME OF INSTALLATION OR REMOVAL. LOSS OF PRESSURE WITHIN EXTERNAL AIRLOCK WOULD INDICATE LEAKAGE ONLY AFTER AN INTERNAL LEAKAGE FAILURE OF ASSOCIATED MANUAL DEPRESS VALVE.

CORRECTING ACTION: MANUAL

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CORRECTING ACTION DESCRIPTION:
NO CREW ACTION REQUIRED UNTIL MANUAL DEPRESS VALVE INTERNALLY LEAKS. THEN:
DURING IVA - CREW COULD: (1) UTILIZE MID DECK CREW CABIN PURGE VALVE IN PLACE OF THE MANUAL DEPRESS VALVE CAP TO SEAL LEAKAGE: (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 USE ANY AVAILABLE MATERIAL, INCLUDING DUCT TAPE, TO SEAL LEAK.

REMARKS/RECOMMENDATIONS:
CAP PROVIDES SECONDARY SEAL PROTECTION AGAINST LEAKAGE THROUGH THE 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 RESULTING IN AN INCREASED USE OF CONSUMABLES.

(C) MISSION:
NO EFFECT FIRST FAILURE. 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):
NO EFFECT FIRST FAILURE. SUBSEQUENT LEAKAGE OF MANUAL DEPRESS VALVE RESULTING IN LOSS OF ODS PRESSURIZATION COULD JEOPARDIZE THE SAFETY OF CREW AND VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FAILURE (LEAKAGE OF PRESSURE CAP) - NO EFFECT. LOSS OF SECONDARY SEAL ONLY.

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

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DURING EVA:
- INABILITY TO REPRESSURIZE EXTERNAL AIRLOCK COULD PREVENT EVA CREWMEMBER'S RETURN TO CREW CABIN. - CRITICALITY 1R2 CONDITION.

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

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: MINUTES

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

PRINT DATE: 02/10/97

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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	:	M. W. GUENTHER	:
DESIGN ENGINEER	:	K. J. KELLY	: