

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE
NUMBER:M8-1SS-E031 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 0 04/08/97

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:VALVE, MANUAL DEPRESSURIZATION CARLETON TECHNOLOGIES	MC250-0004-0011 2765-0001-1

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
EXTERNAL AIRLOCK MANUAL DEPRESSURIZATION VALVE

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
 PROVIDES CAPABILITY FOR DEPRESSURIZATION OF THE ODS BY VENTING PRESSURE OVERBOARD VIA A VACUUM VENT LINE AND TEE. THE VALVE IS A BUTTERFLY VALVE THAT HAS TWO FLOW POSITIONS FIXED BY DETENTS IN THE ACTUATION MECHANISM. THIS VALVE IS MANUALLY OPERATED WITHIN THE EXTERNAL AIRLOCK.

REFERENCE DOCUMENTS: VS28-643001
 VB28-643050

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-GIL FAILURE MODE

NUMBER: MB-1SS-E031-02

REVISION#: 0 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS

LRU: VALVE, MANUAL DEPRESSURIZATION

ITEM NAME: VALVE, MANUAL DEPRESSURIZATION

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:

FAILS TO CLOSE, INTERNAL LEAKAGE

MISSION PHASE: OO ON-ORBIT

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

CAUSE:

CORROSION, CONTAMINATION, PHYSICAL BINDING/JAMMING, EXCESSIVE VIBRATION, MECHANICAL SHOCK, MATERIAL DEFECT, FATIGUE

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 - VALVE DOES NOT CLOSE WHEN MANUALLY OPERATED.
INSTRUMENTATION - LOSS OF PRESSURE WITHIN EXTERNAL AIRLOCK.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:

CREW COULD INSTALL CAP ON DEPRESSURIZATION VALVE INLET FOLLOWING FIRST FAILURE AND UTILIZE EXTERNAL AIRLOCK AFT HATCH EQUALIZATION VALVES FOR FUTURE VENTING.

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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:
NONE

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF PRIMARY SEAL. PRESSURE IS ALLOWED TO VENT OUT THROUGH VALVE WHEN ODS IS PRESSURIZED.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT FIRST FAILURE SINCE CAP PROVIDES REDUNDANT SEAL. SECOND ASSOCIATED FAILURE (LEAKAGE OF CAP) WILL RESULT IN EXCESS LOSS OF CONSUMABLES.

(C) MISSION:

NO EFFECT FIRST FAILURE. LOSS OF MISSION IF SECOND ASSOCIATED FAILURE (INABILITY TO MATE CAP DEPRESS VALVE CAP OR CAP LEAKAGE) OCCURS DUE TO: (1) EXCESSIVE LOSS OF CONSUMABLES; OR (2) LOSS OF CAPABILITY TO PERFORM PLANNED EVA DUE TO INABILITY TO REPRESSURIZE THE ODS VOLUME FOR RETURNING TO THE CREW MODULE.

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

NO EFFECT FIRST FAILURE. LOSS OF EVA CREWMEMBERS IF SECOND ASSOCIATED FAILURE (DEPRESS VALVE CAP LEAKAGE) OCCURS DURING EVA AND EXTERNAL AIRLOCK CANNOT BE REPRESSURIZED.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE - LOSS OF PRIMARY SEAL

SECOND ASSOCIATED (INABILITY TO MATE DEPRESS VALVE CAP OR CAP LEAKAGE) IF OCCURS:

DURING EVA:

UNABLE TO REPRESSURIZE EXTERNAL AIRLOCK FOR EVA CREWMEMBERS RETURN TO CREW CABIN - CRITICALITY 1R2 CONDITION.

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DURING IVA:

EXTERNAL LEAKAGE OF HABITABLE PRESSURE IF SECOND FAILURE OCCURS DURING IVA 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: SECONDS

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

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).

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- APPROVALS -

SS & PAE
DESIGN ENGINEER

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