

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-CIL FAILURE MODE

NUMBER: M8-1SS-E031-03

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SUBSYSTEM NAME: ECLSS - ARPCS

LRU: VALVE, MANUAL DEPRESSURIZATION

ITEM NAME: VALVE, MANUAL DEPRESSURIZATION

CRITICALITY OF THIS
FAILURE MODE: 1R3FAILURE MODE:
RESTRICTED FLOW

MISSION PHASE: OO ON-ORBIT

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

CAUSE:
CORROSION, CONTAMINATION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN	A) PASS
	B) PASS
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

METHOD OF FAULT DETECTION:
INSTRUMENTATION/PHYSICAL OBSERVATION - SLOW VENTING OF PRESSURE TO
OUTSIDE.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:
CREW COULD UTILIZE ONE OR BOTH EQUALIZATION VALVES ON THE EXTERNAL
AIRLOCK AFT HATCH (WHEN A PRESSURIZED PAYLOAD IS NOT INSTALLED) OR UTILIZE
ONE OR BOTH EQUALIZATION VALVES ON THE TUNNEL ADAPTER "C" HATCH (WHEN A
PRESSURIZED PAYLOAD IS INSTALLED) TO VENT PRESSURE TO THE OUTSIDE WHEN

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ORBITER AND SPACE STATION ARE DOCKED. ADDITIONAL CAPABILITY TO DEPRESSURIZE ODS IS AVAILABLE WHEN ORBITER AND SPACE STATION ARE NOT DOCKED BY THE USE OF ONE OR BOTH EQUALIZATION VALVES ON EXTERNAL AIRLOCK UPPER HATCH.

REMARKS/RECOMMENDATIONS:

VALVE IS ONLY UTILIZE TO DEPRESSURIZE ODS FOR PERFORMING AN EVA. FILTER PROVIDED WITHIN DEPRESSURIZATION VALVE WILL HELP SCREEN OUT CONTAMINATES.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

FUNCTIONAL DEGRADATION - REDUCED AIRFLOW THRU DEPRESSURIZATION VALVE.

(B) INTERFACING SUBSYSTEM(S):

INCREASED USE OF EMU OXYGEN DURING EVA OPERATIONS. EVA ACTIVITIES WOULD BE MORE COMPLEX.

(C) MISSION:

ODS DEPRESS/EVA OPERATIONS WOULD REQUIRE MORE TIME. NO EFFECT UNTIL ALL ODS DEPRESSURIZATION CAPABILITIES ARE LOST. THEN INABILITY TO DEPRESSURIZE ODS TO PERFORM A PLANNED EVA WOULD RESULT IN LOSS OF MISSION OBJECTIVES ASSOCIATED WITH EVA.

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

CREW INCONVENIENCE - INCREASE USE OF CREWS TIME IN COMPLETING ODS DEPRESS/EVA OPERATIONS. NO EFFECT UNTIL ALL ODS DEPRESSURIZATION CAPABILITIES ARE LOST. THEN INABILITY TO DEPRESSURIZE ODS TO PERFORM A CONTINGENCY EVA COULD RESULT IN LOSS OF CREW AND VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

WORST CASE WHEN ORBITER AND SPACE STATION ARE DOCKED:

FIRST FAILURE (RESTRICTED AIRFLOW THRU DEPRESS VALVE) - ODS DEPRESS OPERATIONS THROUGH DEPRESS VALVE WOULD REQUIRE MORE TIME. WORST CASE IF AIRFLOW IS COMPLETELY RESTRICTED, LOSS OF ODS DEPRESS CAPABILITIES USING EXTERNAL AIRLOCK MANUAL DEPRESS VALVE.

SECOND FAILURE (FIRST EQUALIZATION VALVE ON EXTERNAL AIRLOCK AFT HATCH (WHEN NO PRESSURIZED PAYLOAD IS INSTALLED) OR ON TUNNEL ADAPTER "C" HATCH (WHEN A PRESSURIZED PAYLOAD IS INSTALLED) FAILS TO OPEN) - NO EFFECT OTHER THAN DEPRESSURIZATION TIME INCREASED WHEN USING A SINGLE EQUALIZATION VALVE TO VENT PRESSURE OVERBOARD.

THIRD FAILURE (SECOND EQUALIZATION VALVE ON EXTERNAL AIRLOCK AFT HATCH (WHEN NO PRESSURIZED PAYLOAD IS INSTALLED) OR ON TUNNEL ADAPTER "C" HATCH

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(WHEN A PRESSURIZED PAYLOAD IS INSTALLED) FAILS TO OPEN) - LOSS OF ALL ODS DEPRESS CAPABILITIES RESULTING IN THE INABILITY TO PERFORM AN EVA. LOSS OF MISSION OBJECTIVES ASSOCIATED WITH A PLANNED EVA. - CRITICALITY 2R3 CONDITION.

FOURTH FAILURE (FAILURE NECESSITATING AN EVA TO CORRECT A POTENTIAL CATASTROPHIC SITUATION) - LOSS OF CONTINGENCY EVA CAPABILITIES TO CORRECT A CRIT 1 CONDITION COULD RESULT IN LOSS OF CREW AND VEHICLE. - CRITICALITY 1R3 CONDITION.

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 1R3

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

NONE. ALL WORKAROUNDS HAVE ALREADY BEEN CONSIDERED WHEN DETERMINING THE 1R3 CRITICALITY.

- 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 AMPLE TIME TO DEPRESSURIZE EXTERNAL AIRLOCK FOR PERFORMING AN EVA USING HATCH EQUALIZATION VALVES BEFORE PROBLEM BECAME CATASTROPHIC.

HAZARD REPORT NUMBER(S): FF-09

HAZARD(S) DESCRIPTION:
INABILITY TO SAFELY PERFORM EVA.

- APPROVALS -

SS & PAE
DESIGN ENGINEER

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

: *M. W. Guenther*
: *K. J. Kelly*