FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M8-1SS-E034 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 0 04/08/97

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:ASSY, RIGID DUCT (EXTERNAL TO A/L)	V828-643101-001
LRU	:ASSY, TEE (EXTERNAL TO A/L)	V828-643307-001
LRU	:ASSY, RIGID DUCT (INTERNAL TO A/L)	V076-643311-001
LRU	:UNION, DUCT (INTERNAL TO A/L)	ME277-0024-0001
SRU	:ASSY, SCREEN (EXTERNAL TO A/L)	V828-643308-001

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
EXTERNAL AIRLOCK DEPRESSURIZATION RIGID DUCTING

QUANTITY OF LIKE ITEMS: 5
FIVE

FUNCTION:
TWO INCH RIGID DUCTS PROVIDE AN AIRFLOW PATH FROM EXTERNAL AIRLOCK DEPRESSURIZATION VALVE TO SPACE VACUUM. A SCREEN ASSY IS PROVIDED BETWEEN THE EXTERNAL RIGID DUCT ASSEMBLY AND TEE ASSY TO PREVENT CONTAMINATION WITHIN THE EXTERNAL AIRLOCK FROM BEING TRANSFERRED TO THE PAYLOAD BAY DURING DEPRESSURIZATION.

REFERENCE DOCUMENTS: VS28-643001
V828-643050
V828-643129

FAILURE MODES EFFECTS ANALYSIS FMEA – NON-CIL FAILURE MODE
NUMBER: M8-1SS-E034-01

REVISION#: 0 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS
LRU: DUCT, RIGID
ITEM NAME: DUCT, RIGID

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE: OO ON-ORBIT

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

CAUSE:
PHYSICAL DAMAGE, EXCESSIVE VIBRATION, MECHANICAL SHOCK, POROSITY, RUPTURED GASKET, 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 - REDUNDANCY IS IN STANDBY UNTIL REQUIRED.

C)

METHOD OF FAULT DETECTION:
INSTRUMENTATION/PHYSICAL OBSERVATION - LOSS OF OR REDUCED PRESSURE IN HABITABLE AREAS. IN ADDITION, THIS FAILURE CAN BE DETECTED THROUGH AUDIO/TACTILE INDICATIONS.

CORRECTING ACTION: MANUAL

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CORRECTING ACTION DESCRIPTION:
DURING IVA:
CREW ACTION TO PROVIDE SEALING OF LEAKAGE IS ADEQUATE TO MAINTAIN PRESSURE WITHIN EXTERNAL AIRLOCK. IN THE EVENT, DUCT CANNOT BE REPAIRED, CREW COULD CLOSE 576 BULKHEAD HATCH TO ISOLATE EXTERNAL LEAKAGE OF PRESSURE FROM CREW CABIN.
DURING EVA:
CREW ACTION TO PROVIDE SEALING OF LEAKAGE IS ADEQUATE TO ALLOW REPRESSURIZATION OF EXTERNAL AIRLOCK FOR CREW RETURN TO CREW CABIN.

REMARKS/RECOMMENDATIONS:
EXTERNAL AIRLOCK DEPRESSURIZATION DUCTING IS SIMILAR IN DESIGN TO THAT CURRENTLY BEING UTILIZED IN THE INTERNAL AIRLOCK DEPRESSURIZATION SYSTEM.

THE SECTION OF THE DEPRESSURIZATION DUCTING THAT IS CONSIDERED CRITICAL TO THIS FAILURE MODE IS INTERNAL TO THE EXTERNAL AIRLOCK AND IS MADE UP OF THE FOLLOWING: (1) A TWO INCH RIGID DUCT ASSEMBLY BETWEEN THE MANUAL DEPRESS VALVE AND UNION WHICH IS MADE UP OF THREE SECTIONS THAT ARE ASSEMBLED TOGETHER WITH O-RING SEALS; AND (2) THE UNION WHICH IS MOUNTED TO THE EXTERNAL AIRLOCK WITH A SINGLE GASKET (P/N MS27196-32) AT THE INTERFACE. THIS DUCTING IS ACCESSIBLE FOR IN-FLIGHT MAINTENANCE.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
FUNCTIONAL DEGRADATION - EXCESSIVE LOSS OF PRESSURE WHEN THE EXTERNAL AIRLOCK IS PRESSURIZED.

(B) INTERFACING SUBSYSTEM(S):
INCREASE USE OF OXYGEN/NITROGEN SUPPLY.

(C) MISSION:
EXCESSIVE USE OF CONSUMABLES MAY LIMIT MISSION DURATION. POSSIBLE LOSS OF EVA CAPABILITY.

(D) CREW, VEHICLE, AND ELEMENT(S):
LOSS OF CONSUMABLES WITHIN ODS, SPACE STATION, AND PRESSURIZED PAYLOAD ENVIRONMENTS WITH 576 BULKHEAD AND EXTERNAL AIRLOCK UPPER & AFT HATCHES OPEN. SAFETY OF CREW MEMBERS IS JEOPARDIZED IF EXTERNAL LEAKAGE WITHIN AIRLOCK CANNOT BE STOPPED OR ISOLATED FROM THE CREW CABIN. POSSIBLE LOSS OF EVA CREW MEMBERS IF ODS PRESSURE CANNOT BE MAINTAINED.

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(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FAILURE (DEPRESS DUCT EXTERNALLY LEAKS) - IF FAILURE OCCURS:
DURING IVA:
LOSS OF PRESSURE WITHIN ODS MAY JEOPARDIZE SAFETY OF CREW AND VEHICLE. - CRITICALITY 1/1 CONDITION.
DURING EVA:
INABILITY TO REPRESSURIZE EXTERNAL AIRLOCK FOR EVA CREWMEMBER'S RETURN TO CREW CABIN. - CRITICALITY 1/1 CONDITION.

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

(F) RATIONALE FOR CRITICALITY DOWNGRADE:
DURING IVA:
SECOND FAILURE (INABILITY TO TAPE LEAK WITH DUCT TAPE) - NO EFFECT UNTIL OTHER MATERIALS CANNOT BE USED TO SEAL LEAK.
THIRD FAILURE (INABILITY TO SEAL LEAK WITH ANY OTHER AVAILABLE MATERIAL) - UNABLE TO STOP EXTERNAL LEAKAGE OF PRESSURE WITHIN ODS HABITABLE VOLUME.
FOURTH FAILURE (INABILITY TO CLOSE 576 BULKHEAD HATCH) - LOSS OF CAPABILITY TO ISOLATE EXTERNAL LEAKAGE OF PRESSURE FROM CREW CABIN RESULTING IN LOSS OF CONSUMABLES. SAFETY OF CREW MEMBERS IS JEOPARDIZED UPON LOSS OF CONSUMABLES. - CRITICALITY 1R3 CONDITION

DURING EVA:
SECOND FAILURE (INABILITY TO TAPE LEAK WITH DUCT TAPE) - NO EFFECT UNTIL OTHER MATERIALS CANNOT BE USED TO SEAL LEAK.
THIRD FAILURE (INABILITY TO SEAL LEAK WITH ANY OTHER AVAILABLE MATERIAL) - LOSS OF EVA CREW MEMBERS IF EVA IS PERFORMED AND EXTERNAL AIRLOCK CANNOT BE REPRESSURIZED FOR CREW RETURN TO CREW CABIN (EVA CREW MEMBERS MUST REMAIN IN EXTERNAL AIRLOCK UNTIL LANDING.). - CRITICALITY 1R3 CONDITION

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: HOURS

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 HAS ENOUGH TIME TO SEAL THE LEAK OR CLOSE THE 576 BULKHEAD HATCH TO ISOLATE EXTERNAL LEAKAGE OF PRESSURE FROM THE CREW CABIN BEFORE THE PROBLEM BECOMES 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	: