

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL HARDWARE
NUMBER:M8-1SS-E008 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 2

04/08/97

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:HATCH ASSEMBLY ROCKWELL INT'L	M072-593830-001 M072-593830-001
SRU	:GAUGE, DELTA PRESSURE CARELTON TECHNOLOGIES	MC250-0004-0007 2767-0001-7

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
EXTERNAL AIRLOCK AFT HATCH DIFFERENTIAL PRESSURE GAUGE

QUANTITY OF LIKE ITEMS: 2
TWO

FUNCTION:
 PROVIDES STATUS OF EXTERNAL AIRLOCK AFT HATCH DIFFERENTIAL PRESSURE BETWEEN EXTERNAL AIRLOCK AND OUTSIDE ENVIRONMENT (WHEN NO PRESSURIZED PAYLOAD IS INSTALLED) OR BETWEEN EXTERNAL AIRLOCK AND TUNNEL ADAPTER (WHEN A PRESSURIZATION PAYLOAD IS INSTALLED) SO THAT CREW CAN ASCERTAIN CONDITIONS BEFORE OPENING THE HATCH. GAUGE MEASURES DELTA PRESSURE BETWEEN PLUS 20 AND MINUS 20 PSID AND IS LOCATED ON BOTH SIDES OF THE EXTERNAL AIRLOCK AFT HATCH.

REFERENCE DOCUMENTS: M072-593830
 V519-331051

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: M8-155-E008-02

REVISION#: 2 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS
 LRU: GAUGE, DELTA PRESSURE
 ITEM NAME: GAUGE, DELTA PRESSURE

CRITICALITY OF THIS
 FAILURE MODE: 1R3

FAILURE MODE:
 ERRONEOUS PRESSURE READING

MISSION PHASE: OO ON-ORBIT

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

CAUSE:
 CONTAMINATION, CORROSION, VIBRATION, MECHANICAL SHOCK

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:
 DELTA PRESSURE ANOMALY

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:
 WHEN A PRESSURIZED PAYLOAD IS NOT INSTALLED - CREW COULD OPEN
 EQUALIZATION VALVE OR UTILIZE CREW CABIN INSTRUMENTATION TO VERIFY
 ODS/OUTSIDE ATMOSPHERE PRESSURE DIFFERENTIAL. THE DEPRESSURIZATION
 VALVING IN THE EXTERNAL AIRLOCK, EVA "C" HATCH EQUALIZATION VALVES OR AFT
 HATCH EQUALIZATION VALVES CAN BE USED TO EQUALIZE THE PRESSURE WITHIN

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THE ODS TO THE OUTSIDE ATMOSPHERIC PRESSURE PRIOR TO OPENING THE EXTERNAL AIRLOCK AFT HATCH.
WHEN A PRESSURIZED PAYLOAD IS INSTALLED - CREW COULD OPEN EQUALIZATION VALVE OR UTILIZE CREW CABIN INSTRUMENTATION TO VERIFY EXTERNAL AIRLOCK AND TUNNEL ADAPTER PRESSURES.

REMARKS/RECOMMENDATIONS:

WORST CASE EFFECT IS WHEN THERE IS A PRESSURIZED PAYLOAD INSTALLED. CREW HAS TO OPEN THE AFT HATCH TO ACCESS THE TUNNEL ADAPTER "C" HATCH FOR PERFORMING AN EVA. RECOMMEND THAT THE AFT HATCH BE REMOVED WHEN A PRESSURIZED PAYLOAD IS INSTALLED.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF PRESSURE GAUGE INDICATION ACROSS EXTERNAL AIRLOCK AFT HATCH.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT FIRST FAILURE. INABILITY TO DETERMINE IF PRESSURE WITHIN TUNNEL ADAPTER HAS DECAYED FOLLOWING A LOSS OF ALL INSTRUMENTATION AND PRESSURE EQUALIZATION CAPABILITIES WILL PRECLUDE OPENING THE AFT HATCH.

(C) MISSION:

NO EFFECT FIRST FAILURE. LOSS OF CAPABILITY TO OPEN EXTERNAL AIRLOCK AFT HATCH FOLLOWING MULTIPLE FAILURES WOULD PRECLUDE CREW ACCESS TO A PRESSURIZED PAYLOAD RESULTING IN LOSS OF MISSION OBJECTIVES ASSOCIATED WITH THE PRESSURIZED PAYLOAD.

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

NO EFFECT UNTIL A CONTINGENCY EVA IS REQUIRED. THEN POSSIBLE LOSS OF CREW AND VEHICLE IF CREW CANNOT OPEN AFT HATCH TO PERFORM AN EVA.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE - LOSS OF GAUGE INDICATION ACROSS EXTERNAL AIRLOCK AFT HATCH. SECOND FAILURE (LOSS OF CREW CABIN DELTA-PRESSURE INDICATIONS) - INABILITY TO VERIFY PRESSURE ACROSS AFT HATCH. AFT HATCH SHOULD NOT BE OPENED IF PRESSURE ACROSS IT CANNOT BE VERIFIED RESULTING IN LOSS OF CONTINGENCY EVA CAPABILITIES.

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

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(F) RATIONALE FOR CRITICALITY DOWNGRADE:

THIRD & FOURTH FAILURES (EXTERNAL AIRLOCK AFT HATCH EQUALIZATION VALVES CANNOT BE OPENED) - INABILITY TO EQUALIZE AND VERIFY PRESSURE ACROSS EXTERNAL AFT HATCH. CREW DECISION NOT TO OPEN AFT HATCH WOULD LOSE ACCESS TO PRESSURIZED PAYLOAD AND TUNNEL ADAPTER EVA "C" HATCH RESULTING IN LOSS OF MISSION OBJECTIVES ASSOCIATED WITH THE PRESSURIZED PAYLOAD OPERATIONS OR WITH PLANNED EVA ACTIVITIES. - CRITICALITY 2R3 CONDITION.

FIFTH FAILURE (FAILURE NECESSITATING A CONTINGENCY EVA TO CORRECT A CRIT 1 CONDITION) - CREW DECISION NOT TO OPEN EXTERNAL AIRLOCK AFT HATCH WOULD LOSE CONTINGENCY EVA CAPABILITIES RESULTING IN POTENTIAL LOSS OF CREW AND VEHICLE. - 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 USE OTHER DELTA-P INDICATIONS OR SIMPLY OPEN AFT HATCH EQUALIZATION VALVES TO EQUALIZE PRESSURE ACROSS AFT HATCH BEFORE THE PROBLEM BECAME CATASTROPHIC TO CREW SAFETY OR CRITICAL TO MISSION SUCCESS.

HAZARD REPORT NUMBER(S): FF-09

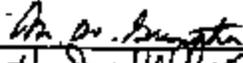
HAZARD(S) DESCRIPTION:

INABILITY TO SAFELY PERFORM EVA.

- APPROVALS -

SS & PAE
DESIGN ENGINEER

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

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