PRINT DATE: 01/27/98

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M8-1SS-E002 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 2 04/09/97

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:HATCH ASSEMBLY ROCKWELL INT'L	M072-593828-001 M072-593828-001
SRU	:VALVE, EQUALIZATION CARLETON TECHNOLIGIES	MC250-0004-0012 2763-0001-9

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
EXTERNAL AIRLOCK UPPER HATCH EQUALIZATION VALVE

QUANTITY OF LIKE ITEMS: 2
TWO

FUNCTION:
PROVIDES FOR EQUALIZING PRESSURE ACROSS THE EXTERNAL AIRLOCK UPPER HATCH, BETWEEN THE EXTERNAL AIRLOCK AND THE VESTIBULE TUNNEL. EACH VALVE OPERATES INDEPENDENTLY WITH POSITIVE DETENTS AT TWO POSITIONS. VALVE CAN BE ACTUATED FROM EITHER SIDE OF HATCH.

REFERENCE DOCUMENTS: V519-331052
V519-593302

FAILURE MODES EFFECTS ANALYSIS FMEA – NON-CIL FAILURE MODE
NUMBER: M9-1SS-E002-02

REVISION#: 2 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS
LRU: VALVE, EQUALIZATION
ITEM NAME: VALVE, EQUALIZATION

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:
MECHANICAL SHOCK, EXCESSIVE VIBRATION, CONTAMINATION, PHYSICAL BINDING/JAMMING, CORROSION, SHOCK, POROSITY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:
A)

B)
N/A - SINCE EQUALIZATION VALVE AND CAP ARE IN STANDBY REDUNDANCY TO EACH OTHER FOR "INTERNAL LEAKAGE" FAILURE MODE

C)

METHOD OF FAULT DETECTION:
NONE FOR FIRST FAILURE. SECOND FAILURE: INSTRUMENTATION - DELTA-PRESSURE INDICATION.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:
NO CREW ACTION REQUIRED IF CAP IS INSTALLED. IF CAP IS NOT INSTALLED, CREW SHOULD INSTALL CAP AND USE REDUNDANT EQUALIZATION VALVE. IN THE EVENT THE

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M8-1SS-E002-02

CAP CANNOT BE INSTALLED, CREW COULD UTILIZE ANY AVAILABLE MATERIAL, INCLUDING THE CAP, TO HOLD AGAINST VALVE INLET AND ALLOW DELTA-PRESSURE ACROSS MATERIAL TO KEEP IT IN PLACE. IF THIS FAILS, CREW COULD ISOLATE LEAKAGE FROM CREW CABIN, DURING IVA FOLLOWING, WHILE ORBITER AND SPACE STATION ARE NOT DOCKED, BY CLOSING 576 BULKHEAD HATCH.

REMARKS/RECOMMENDATIONS:
SECONDARY SEAL PROVIDED BY EQUALIZATION CAP.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF PRIMARY SEAL (INTERNAL VALVE SEAL).

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT FIRST FAILURE SINCE CAP PROVIDES REDUNDANT SEAL.

(C) MISSION:
NO EFFECT FIRST FAILURE. SECOND ASSOCIATED FAILURE (CAP LEAKAGE): (1) IF FAILURE OCCURS PRIOR TO DOCKING WITH THE SPACE STATION, MISSION WOULD BE TERMINATED DUE TO EXCESSIVE LOSS OF CONSUMABLES; (2) IF FAILURE OCCURS WHILE ORBITER & SPACE STATION ARE DOCKED - INABILITY TO DEPRESSURIZE VESTIBULE TUNNEL FOR SEPARATION WITHOUT EFFECTING THE ODS VOLUME; (3) LOSS OF CAPABILITY TO PERFORM AN EVA WHEN ORBITER AND SPACE STATION ARE NOT DOCKED DUE TO INABILITY TO REPRESSURIZE THE ODS VOLUME FOR RETURNING TO THE CREW MODULE.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT FIRST FAILURE. SECOND ASSOCIATED FAILURE COULD RESULT IN LOSS OF CREW DURING NON-DOCKED IVA/EVA ACTIVITES.

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FAILURE - NO EFFECT.

DURING EVA WHEN ORBITER/SPACE STATION ARE NOT DOCKED:
(2A) SECOND ASSOCIATED (CAP LEAKAGE) - UNABLE TO NOMINALLY MAINTAIN PRESSURE WITHIN EXTERNAL AIRLOCK FOR EVA CREWMEMBERS RETURN TO CREW CABIN. - CRITICALITY 1R2 CONDITION

DURING IVA (CAMERA PREPARATION FOR DOCKING) WHEN ORBITER/SPACE STATION ARE NOT DOCKED:
(2B) SECOND FAILURE (CAP LEAKAGE) - EXCESSIVE EXTERNAL LEAKAGE OF HABITABLE PRESSURE. - CRITICALITY 1R2 CONDITION

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M8-1SS-E002-02

IF SECOND FAILURE OCCURS WHEN ORBITER/SPACE STATION ARE DOCKED:
POSSIBLE LOSS OF PRESSURE IN SPACE STATION IF ISOLATION BETWEEN EXTERNAL AIRLOCK AND SPACE STATION IS LOST DURING EVA WHEN ODS IS DEPRESSURIZED.

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 1R2

(F) RATIONALE FOR CRITICALITY DOWNGRADE:
DURING EVA WHEN ORBITER/SPACE STATION ARE NOT DOCKED:
(3A) THIRD FAILURE (INABILITY TO HOLD ANY AVAILABLE MATERIAL AGAINST VALVE INLET) - POSSIBLE LOSS OF EVA CREWMEMBERS IF ODS VOLUMES CANNOT BE REPRESSURIZED FOR CREW RETURN TO CREW CABIN. (EVA CREWMEMBERS MUST REMAIN IN AIRLOCK UNTIL LANDING). - CRITICALITY 1R3 CONDITION.

DURING IVA (CAMERA PREPARATION FOR DOCKING) WHEN ORBITER/SPACE STATION ARE NOT DOCKED:
(3B) THIRD FAILURE (INABILITY TO HOLD ANY AVAILABLE MATERIAL AGAINST VALVE INLET) - UNABLE TO STOP EXTERNAL LEAKAGE OF PRESSURE.
(4B) THIRD FAILURE (INABILITY TO CLOSE 576 BULKHEAD HATCH):
WHEN ORBITER AND SPACE STATION ARE NOT DOCKED - LOSS OF CAPABILITY TO ISOLATE EXTERNAL LEAKAGE OF HABITABLE PRESSURE FROM CREW CABIN. INCREASED USE OF CONSUMABLES COULD JEOPARDIZE SAFETY OF CREW AND VEHICLE DURING IVA (CAMERA PREPARATION FOR DOCKING). - 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: SECONDS

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 STOP EXTERNAL LEAKAGE OF HABITABLE PRESSURE BY INSTALLING CAP OR HOLDING ANY MATERIAL AGAINST VALVE INLET OR ISOLATE LEAKAGE 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).

PRINT DATE: 05/05/97

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M8-1SS-E002-02

- APPROVALS -

SS & PAE	:	M. W. GUENTHER	:
DESIGN ENGINEER	:	K. J. KELLY	: