

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE
NUMBER: M8-1SS-E007 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 2

04/08/97

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:CAP, PRESSURE CARELTON TECHNOLOGIES	MC250-0004-0010 2763-2001-7

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

QUANTITY OF LIKE ITEMS: 2
TWO

FUNCTION:
CAPS ONTO EQUALIZATION VALVE TO PROVIDE SECONDARY PROTECTION FOR
INTERNAL LEAKAGE ACROSS EXTERNAL AIRLOCK UPPER HATCH.

REFERENCE DOCUMENTS: **V519-331052**
 V519-593302

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: M8-1SS-ED07-01

REVISION#: 2 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS

LRU: CAP, EQUALIZATION VALVE PRESSURE

ITEM NAME: CAP, EQUALIZATION VALVE PRESSURE

CRITICALITY OF THIS

FAILURE MODE: 1R3

FAILURE MODE:
INABILITY TO MATE

MISSION PHASE: OO ON-ORBIT

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

CAUSE:
CONTAMINATION, PHYSICAL BINDING/JAMMING, CORROSION, VIBRATION, MECHANICAL SHOCK

CRITICALITY 1/I DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN	A) PASS
	B) PASS
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

METHOD OF FAULT DETECTION:
PHYSICAL OBSERVATION - CREW UNABLE TO PHYSICALLY MATE PRESSURE CAP ON UPPER HATCH EQUALIZATION VALVE.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:
NONE WHEN ORBITER/ISS ARE DOCKED SINCE UPPER HATCH IS OPEN. NO CREW ACTION REQUIRED UNTIL VALVE INTERNALLY LEAKS WHEN ORBITER/ISS ARE NOT DOCKED. THEN CREW CAN STOP LEAKAGE BY HOLDING THE CAP AGAINST THE VALVE

**FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M8-1SS-E007-01**

INLET TO ALLOW DELTA-PRESSURE TO HOLD THE CAP IN PLACE. IF THIS FAILS CREW COULD ISOLATE EXTERNAL LEAKAGE BY CLOSING 576 BULKHEAD HATCH.

REMARKS/RECOMMENDATIONS:

SECONDARY SEAL PROVIDED BY EQUALIZATION CAP. PRIMARY SEAL PROVIDED BY EQUALIZATION VALVE. THIS FAILURE MODE ASSUMES THAT NO OTHER CAPS CAN BE MATED TO THE SAME EQUALIZATION VALVE BECAUSE OF DAMAGE TO THE THREADS ON EQUALIZATION VALVE WHERE CAP MATES. CRITICALITY OF THIS FAILURE MODE IS BASED ON THE WORST CASE EFFECT WHEN THE ORBITER AND ISS ARE NOT DOCKED.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LOSS OF SECONDARY SEAL TO EQUALIZATION VALVE.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT UNTIL PRIMARY SEAL (EQUALIZATION VALVE) IS LOST. LOSS OF ISOLATION BETWEEN EXTERNAL AIRLOCK AND OUTSIDE ATMOSPHERE FOLLOWING INTERNAL LEAKAGE OF ASSOCIATED EQUALIZATION VALVE (WHEN ORBITER AND ISS ARE NOT DOCKED) COULD RESULT IN AN EXCESSIVE USE OF CONSUMABLES.

(C) MISSION:

NO EFFECT UNTIL PRIMARY SEAL (EQUALIZATION VALVE) IS LOST. THEN: (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. POSSIBLE LOSS OF EVA CREWMEMBERS IF SECOND ASSOCIATED FAILURE (INTERNAL LEAKAGE OF EQUALIZATION VALVE) OCCURS DURING AN EVA WHEN ORBITER/ISS ARE NOT DOCKED AND WORKAROUND CANNOT MAINTAIN PRESSURE WITHIN EXTERNAL AIRLOCK.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE (INABILITY TO MATE PRESSURE CAP) - NO EFFECT. LOSS OF SECONDARY SEAL ONLY.
SECOND ASSOCIATED FAILURE (EQUALIZATION VALVE INTERNAL LEAKAGE) IF OCCURS:

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
NUMBER: M8-1SS-E007-01**

DURING IVA (CAMERA PREPARATION FOR DOCKING) WHEN ORBITER/SPACE STATION ARE NOT DOCKED:

EXTERNAL LEAKAGE OF HABITABLE PRESSURE RESULTING IN AN INCREASED USE OF CONSUMABLES. - CRITICALITY 1R2 CONDITION

DURING EVA WHEN ORBITER/SPACE STATION ARE NOT DOCKED:

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

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 AND IF EXTERNAL AIRLOCK IS DEPRESSURIZED.

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

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

DURING IVA WHEN ORBITER/ISS ARE NOT DOCKED:

THIRD FAILURE (UNABLE TO HOLD CAP AGAINST VALVE INLET TO ALLOW DELTA-PRESSURE TO KEEP CAP IN PLACE) - UNABLE TO MAINTAIN PRESSURE WITHIN EXTERNAL AIRLOCK.

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 COULD JEOPARDIZE SAFETY OF CREW AND VEHICLE. - CRITICALITY 1R3 CONDITION.

DURING EVA WHEN ORBITER/ISS ARE NOT DOCKED:

THIRD FAILURE (UNABLE TO HOLD CAP AGAINST VALVE INLET TO ALLOW DELTA-PRESSURE TO KEEP CAP IN PLACE) - UNABLE TO MAINTAIN PRESSURE WITHIN EXTERNAL AIRLOCK. 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: IMMEDIATE

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:

DURING NON-DOCKED IVA ACTIVITIES, CREW WOULD HAVE ENOUGH TIME TO STOP LEAKAGE BY HOLDING CAP TO VALVE INLET OR TO ISOLATE EXTERNAL LEAKAGE OF

**FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M8-1SS-E007-01**

HABITABLE PRESSURE BY CLOSING THE 576 BULKHEAD HATCH, FOLLOWING SECOND FAILURE, BEFORE THE PROBLEM BECAME CATASTROPHIC.

HAZARD REPORT NUMBER(S): ORBI 511, ORBI 162

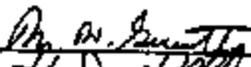
HAZARD(S) DESCRIPTION:

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).

- APPROVALS -

SS & PAE
DESIGN ENGINEER

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

: 
: 