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PRINT DATE: 10/13/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE

NUMBER: M8-1MR-E026-X

SUBSYSTEM NAME: ECLSS - SPACELAB

REVISION: 2 9/15/95

PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU : NUT, FLEXIBLE AIR DUCT COUPLING	V727-634115-001

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

EXTERNAL AIRLOCK/SPACELAB (PRESSURIZED PAYLOAD) FLEXIBLE AIR DUCT COUPLING NUT

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 1

ONE

FUNCTION:

PROVIDES QUICK CONNECT/DISCONNECT OF THE SPACELAB (OR OTHER PRESSURIZED PAYLOAD) INLET FLEXIBLE DUCT TO/FROM EXTERNAL AIRLOCK RIGID DUCT. THE OTHER END OF THE FLEXIBLE DUCT CONNECTS TO THE SPACELAB (OR PRESSURIZED PAYLOAD) DUCT AIR ELBOW ADAPTER USING A LATCHING OVER-CENTER CLAMP. THIS FMEA IS ONLY APPLICABLE IF THERE IS A PRESSURIZED PAYLOAD CONNECTED TO THE EXTERNAL AIRLOCK AFT ADAPTER.

REFERENCE DOCUMENTS: V519-634115

M072-643400

M072-643829

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FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL FAILURE MODE
NUMBER: M8-1MR-E026-01

REVISION# 2 9/15/95

SUBSYSTEM NAME: ECLSS - PRESSURIZED PAYLOAD
 LRU: NUT, FLEXIBLE AIR DUCT COUPLING
 ITEM NAME: NUT, FLEXIBLE AIR DUCT COUPLING

CRITICALITY OF THIS
 FAILURE MODE: 1R3

FAILURE MODE:
 UNABLE TO DISCONNECT

MISSION PHASE:
 OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

CAUSE:
 MECHANICAL SHOCK, PHYSICAL DAMAGE, OVER TIGHTENED, CORROSION/
 CONTAMINATION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

CRITICALITY 1R2 DURING INTACT ABORT ONLY (AVIONICS ONLY)? N/A

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

PASS/FAIL RATIONALE:
 A)

B)
 N/A - AT LEAST TWO REMAINING PATHS ARE DETECTABLE IN FLIGHT.

C)

METHOD OF FAULT DETECTION:
 PHYSICAL OBSERVATION

CORRECTING ACTION: CREW CAN DISCONNECT OTHER END OF FLEXIBLE DUCT BY USING THE LATCHING OVERCENTER CLAMP. IF THE CLAMP CANNOT BE REMOVED, GIVEN ENOUGH TIME, THE CREW COULD SEPARATE THE FLEXIBLE DUCT FROM THE ELBOW AT THE NUT END OR FROM THE FLANGE AT THE CLAMP END BY REMOVING THE FLEXIBLE DUCT STRAP OR CUT THE FLEXIBLE DUCT ITSELF. ONCE SEPARATED THE FLEXIBLE DUCT CAN BE STOWED AND EXTERNAL AIRLOCK AFT HATCH CLOSED.

REMARKS/RECOMMENDATIONS:
 THE COUPLING NUT CAN BE SCREWED OR UNSCREWED DURING FLIGHT. EACH REQUIRES SIX FULL 360 DEGREE TURNS TO REMOVE WHICH TAKES ABOUT 22 SECONDS TO ACCOMPLISH. THIS FMEA IS ONLY APPLICABLE IF THERE IS A PRESSURIZED PAYLOAD CONNECTED TO THE EXTERNAL AIRLOCK AFT ADAPTER.

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NUMBER: M8-1MR-E026-01

- FAILURE EFFECTS -

(A) SUBSYSTEM:

UNABLE TO REMOVE SPACELAB (OR OTHER PRESSURIZED PAYLOAD) FLEXIBLE DUCT AT EXTERNAL AIRLOCK RIGID DUCT OUTLET. NO EFFECT FIRST FAILURE. FAILURE TO DETACH FLEXIBLE DUCT AT OTHER END WOULD RESULT IN LOSS OF CAPABILITY TO QUICKLY CLOSE EXTERNAL AIRLOCK AFT HATCH WHEN REQUIRED.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT ON ORBITER INTERFACING SUBSYSTEMS.

(C) MISSION:

NO EFFECT UNTIL EXTERNAL AIRLOCK AFT HATCH CANNOT BE CLOSED. AT WHICH TIME MISSION OBJECTIVES WOULD BE LOST SINCE SPACELAB (OR OTHER PRESSURIZED PAYLOAD) CANNOT BE USED FOLLOWING AN EMERGENCY EVA OUT EXTERNAL AIRLOCK.

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

NO EFFECT FIRST FAILURE. FAILURE TO QUICKLY CLOSE EXTERNAL AIRLOCK AFT HATCH FOLLOWING SECOND FLEXIBLE DUCT ATTACHMENT FAILURE COULD JEOPARDIZE THE SAFETY OF CREW AND VEHICLE IF AN EXCESSIVE LEAK WITHIN SPACELAB (OR OTHER PRESSURIZED PAYLOAD) OCCURS OR IF CONTINGENCY EVA IS REQUIRED.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE (UNABLE TO DISCONNECT COUPLING NUT) - NO EFFECT.
SECOND FAILURE (UNABLE TO DISCONNECT QUICK DISCONNECT CLAMP ON OTHER END OF FLEXIBLE DUCT) - INABILITY TO QUICKLY DETACH FLEXIBLE DUCT AT BOTH ENDS RESULTING IN LOSS OF CAPABILITY TO CLOSE EXTERNAL AIRLOCK AFT HATCH IN A TIMELY MANNER.

THIRD FAILURE: (1) AN EXCESSIVE PRESSURE LEAK WITHIN THE SPACELAB (OR OTHER PRESSURIZED PAYLOAD) - CREW IS PREVENTED FROM ISOLATE THE EXTERNAL AIRLOCK FROM THE SPACELAB (OR OTHER PRESSURIZED PAYLOAD) RESULTING IN LOSS OF CONSUMABLES WITHIN EXTERNAL AIRLOCK HABITABLE VOLUME. CREW SAFETY JEOPARDIZED WITH LOSS OF CONSUMABLES. (2) AN EXCESSIVE PRESSURE LEAK WITH EXTERNAL AIRLOCK - INABILITY TO ISOLATE SPACELAB (OR OTHER PRESSURIZED PAYLOAD) FROM EXTERNAL AIRLOCK VOLUME COULD RESULT IN LOSS OF PRESSURE WITHIN SPACELAB (OR OTHER PRESSURIZED PAYLOAD). INSUFFICIENT AMOUNT OF CONSUMABLES TO REPRESSURIZE EXTERNAL AIRLOCK AND SPACELAB (OR OTHER PRESSURIZED PAYLOAD) VOLUMES TOGETHER COULD PRECLUDE CONTINGENCY EVA CAPABILITIES OUT EXTERNAL AIRLOCK.

POSSIBLE LOSS OF PRESSURE IN MIR WITH EXTERNAL AIRLOCK UPPER HATCH OPEN FOLLOWING THIRD FAILURE.

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

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

NONE. THE CRITICALITY OF THIS FAILURE MODE REMAINS UNCHANGED.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: HOURS TO DAYS

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NUMBER: M8-1MR-E026-01**

TIME FROM FAILURE OCCURRENCE TO DETECTION: IMMEDIATE

TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: MINUTES TO HOURS

IS TIME REQUIRED TO IMPLEMENT CORRECTIVE ACTION LESS THAN TIME TO EFFECT?
YES

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW WOULD HAVE AMPLE TIME TO REMOVE THE FLEXIBLE DUCT AND CLOSE
EXTERNAL AIRLOCK AFT HATCH BEFORE LOSS OF CONSUMABLES BECAME
GATASTROPHIC.

HAZARDS REPORT NUMBER(S): ORB: 511

HAZARD(S) DESCRIPTION:
LOSS OF HABITABLE PRESSURE.

- APPROVALS -

PRODUCT ASSURANCE ENGR. :	M. W. GUENTHER	:	<u><i>M. W. Guenther</i></u>
DESIGN ENGINEER :	K. N. DUONG	:	<u><i>K. N. Duong</i></u>