

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE
NUMBER:M8-1SS-E025 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 2

04/08/97

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	:NUT, FLEXIBLE AIR DUCT COUPLING	V727-643115-001

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
 FAN PACKAGE MUFFLER DUCT/CABIN ARS FLOOR SUPPLY VENTURI NOZZLE
 FLEXIBLE AIR DUCT COUPLING NUT

QUANTITY OF LIKE ITEMS: 3
 THREE

FUNCTION:
 PROVIDES QUICK CONNECT/DISCONNECT OF THE FLEXIBLE AIR DUCT/MUFFLER AT THREE POINTS: (1) ONE END OF FLEXIBLE DUCT TO/FROM THE ORBITER CABIN ARS FLOOR SUPPLY VENTURI NOZZLE; (2) OTHER END OF FLEXIBLE DUCT TO/FROM THE FAN PACKAGE MUFFLER INLET; AND (3) MUFFLER OUTLET TO/FROM FAN PACKAGE INLET.

REFERENCE DOCUMENTS:

- V727-643115
- V828-643270
- V828-643001
- M072-643402
- M072-643406

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE

NUMBER: M8-1SS-E025-01

REVISION#: 2 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS

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:	103	DISCOVERY
	104	ATLANTIS
	105	ENDEAVOUR

CAUSE:

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

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:

PHYSICAL OBSERVATION - UNABLE TO TURN.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:

CREW COULD REMOVE FLEXIBLE DUCT BETWEEN THE ORBITER CABIN FLOOR SUPPLY
VENTURI NOZZLE AND FAN PACKAGE MUFFLER USING QUICK DISCONNECT NUT ON
OTHER END OR REMOVE THE MUFFLER FROM THE FAN PACKAGE INLET. IF REQUIRED,
CREW COULD SEPARATE THE FLEXIBLE DUCT FROM THE ELBOW AT EITHER END BY

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REMOVING THE FLEXIBLE DUCT CLAMP OR CUTTING THE FLEXIBLE DUCT IN THE EVENT THE MUFFLER/DUCT CANNOT BE REMOVED. ONCE SEPARATED THE MUFFLER/FLEXIBLE DUCT CAN BE STOWED AND 576 BULKHEAD HATCH CLOSED.

REMARKS/RECOMMENDATIONS:

COUPLING NUTS CAN BE SCREWED OR UNSCREWED DURING FLIGHT. EACH REQUIRES SIX FULL 360 DEGREE TURNS TO REMOVE WHICH TAKES ABOUT 22 SECONDS TO ACCOMPLISH. THERE ARE THREE NUTS LOCATED ON THE MUFFLER/FLEX DUCT BETWEEN VENTURI NOZZLE AND FAN PACKAGE INLET. THIS MUFFLER/FLEX DUCT CAN BE SEPARATED USING ANY ONE OF THESE THREE NUTS FOR CLOSING OF THE 576 BULKHEAD HATCH.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

UNABLE TO REMOVE MUFFLER/FLEXIBLE DUCT AT ONE POINT. NO EFFECT SINCE MUFFLER/FLEXIBLE DUCT CAN BE SEPARATED AT ANY ONE OF TWO PLACES.

(B) INTERFACING SUBSYSTEM(S):

NO EFFECT FIRST OR SECOND FAILURE. FAILURE TO QUICKLY DISCONNECT MUFFLER/FLEXIBLE DUCT AT THE REMAINING POINT, WHEN REQUIRED, WOULD PRECLUDE IMMEDIATE CLOSURE OF 576 BULKHEAD HATCH. THEN INCREASED USE OF CABIN CONSUMABLES IF AN EXCESSIVE PRESSURE LEAK OCCURS WITHIN ODS HABITABLE VOLUME.

(C) MISSION:

NO EFFECT. MISSION OBJECTIVES ARE MET WITH FLEXIBLE DUCT ATTACHED.

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

NO EFFECT FIRST AND SECOND FAILURE. LOSS OF CAPABILITY TO CLOSE 576 BULKHEAD HATCH FOLLOWING THIRD FAILURE COULD JEOPARDIZE SAFETY OF CREW AND VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE (UNABLE TO DISCONNECT COUPLING NUT THAT ATTACHES MUFFLER/FLEXIBLE DUCT TO VENTURI VALVE) - NO EFFECT
SECOND FAILURE (UNABLE TO DISCONNECT COUPLING NUT THAT ATTACHES FLEXIBLE DUCT TO MUFFLER INLET) - NO EFFECT, LOSS OF REDUNDANCY ONLY.
THIRD FAILURE (UNABLE TO DISCONNECT COUPLING NUT THAT ATTACHES MUFFLER TO FAN PACKAGE INLET) - UNABLE TO CLOSE 576 BULKHEAD HATCH IN A TIMELY MANNER, WHEN REQUIRED.
FOURTH FAILURE (EXCESSIVE PRESSURE LEAK WITHIN ODS HABITABLE VOLUME) - WORST CASE, LOSS OF CAPABILITY TO ISOLATE CABIN FROM EXTERNAL AIRLOCK

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RESULTING IN EXCESSIVE LOSS OF CREW CABIN CONSUMABLES. CREW/VEHICLE
SAFETY JEOPARDIZED WITH LOSS OF CONSUMABLES.

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

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

NONE. WORKAROUND TO REMOVE FLEXIBLE DUCT CLAMPS OR CUT DUCT HAS NO
EFFECT ON THE CRITICALITY OF THIS FAILURE MODE. FAILURE MODE REMAINS AT
1R3.

- 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:

CREW WOULD HAVE AMPLE TIME TO REMOVE THE MUFFLER/FLEXIBLE DUCT(S) USING
OTHER QUICK DISCONNECT NUTS LOCATED ON THESE DUCTS TO CLOSE 576
BULKHEAD HATCH BEFORE LOSS OF CONSUMABLES DUE TO AN EXTERNAL LEAKAGE
CONDITION BECAME CATASTROPHIC.

HAZARD REPORT NUMBER(S): NONE - HAZARD WAS CLOSED OUT AT THE ANALYSIS
LEVEL AND NEVER ELEVATED TO AN ORBITER HAZARD REPORT.

HAZARD(S) DESCRIPTION:

N/A

- APPROVALS -

SS & PAE
DESIGN ENGINEER

: M. W. GUENTHER
: K. N. DUONG

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: *K. N. Duong*