U.S. Gov't

 PRINT DATE: 09/18/95

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

SUBSYSTEM NAME: ECLSS - MIR

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:
FAN PACKAGE MUFFLER INLET/CABIN ARS FLOOR SUPPLY VENTURI NOZZLE FLEXIBLE AIR DUCT COUPLING NUT

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 3
THREE

FUNCTION:
PROVIDES QUICK CONNECT/DISCONNECT OF FLEXIBLE DUCTS TO AND FROM THE FOLLOWING THREE LOCATIONS: (1) TUNNEL ADAPTER FLEXIBLE AIR DUCT ELBOW TO/FROM FAN PACKAGE OUTLET FITTING; (2) TO/FROM EXTERNAL AIRLOCK UPPER TEE RIGID DUCT. (THE OTHER END OF THE FLEXIBLE DUCT CONNECTS TO THE MIR DIFFUSER USING A STRAP); AND (3) EXTERNAL AIRLOCK LOWER TEE FLEXIBLE DUCT TO/FROM THE TUNNEL ADAPTER OUTLET DUCT. (THE OTHER END OF THE FLEXIBLE DUCT CONNECTS TO THE EXTERNAL AIRLOCK LOWER TEE USING A STRAP.)

WHEN DISCONNECTED THE FLEXIBLE DUCTS ARE STOWED.

REFERENCE DOCUMENTS: V519-634115
V727-634115
M072-643400
M072-643829

FAILURE MODES EFFECTS ANALYSIS (FMEA) – CIL FAILURE MODE
NUMBER: M8-1MR-E025- 01

REVISION# 2 9/15/95

SUBSYSTEM NAME: ECLSS - TUNNEL/AIRLOCK
LRU: NUT, FLEXIBLE DUCT COUPLING
ITEM NAME: NUT, FLEXIBLE DUCT COUPLING

CRITICALITY OF THIS FAILURE MODE: 2/2

FAILURE MODE:
LOOSE, CRACKED, OR BROKEN

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

CAUSE:
VIBRATION, MECHANICAL SHOCK, PHYSICAL DAMAGE

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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

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

PASS/FAIL RATIONALE:
A)
N/A

B)
N/A

C)
N/A

METHOD OF FAULT DETECTION:
A LOOSE, CRACKED, OR BROKEN NUT COULD BE VISUALLY DETECTED AND THE RESULTING REDUCED OR LOSS OF AIRFLOW CAN BE PHYSICALLY OBSERVED.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
POSSIBLE INADVERTENT SEPARATION OF FLEXIBLE DUCT. POTENTIAL FOR EXTERNAL LEAKAGE OF CABIN GENERATED AIRFLOW. POSSIBLE DECREASED OR LOSS OF AIRFLOW TO TUNNEL ADAPTER, EXTERNAL AIRLOCK, VESTIBULE TUNNEL, SPACELAB (MIR 1 ONLY), AND/OR MIR ENVIRONMENT.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT ON INTERFACING ORBITER SUBSYSTEMS.

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(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION IF FAILURE OCCURS PRIOR TO COMPLETION OF IVA. LOSS OF OR DECREASED AIRFLOW TO EXTERNAL AIRLOCK/VESTIBULE TUNNEL INTERFACE COULD RESULT IN FOGGING OF EXTERNAL AIRLOCK UPPER HATCH WINDOW. REDUCED VISIBILITY CAUSED BY WINDOW FOGGING WOULD PRECLUDE MIR DOCKING CAPABILITIES.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT ON CREW AND VEHICLE.

(E) FUNCTIONAL CRITICALITY EFFECTS:
N/A

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 2/2

(F) RATIONALE FOR CRITICALITY DOWNGRADE:
N/A (UNDER WORST CASE CONDITIONS, THERE ARE NO WORKAROUNDS TO CIRCUMVENT A BROKEN OR CRACKED COUPLING NUT. A LOOSE NUT CAN BE TIGHTENED.)

-TIME FRAME-

TIME FROM FAILURE TO CRITICAL EFFECT: HOURS TO DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS TO MINUTES

TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: N/A

IS TIME REQUIRED TO IMPLEMENT CORRECTIVE ACTION LESS THAN TIME TO EFFECT? NO

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
THERE IS NO CORRECTIVE ACTION TO RESTORE A CRACKED OR BROKEN COUPLING NUT.

HAZARDS REPORT NUMBER(S): DM2SHA03(F)

HAZARD(S) DESCRIPTION:
LOSS OF AIR CIRCULATION IN ODS/DOCKING MODULE HABITABLE ENVIRONMENT.

-DISPOSITION RATIONALE-

(A) DESIGN:
THE COUPLING NUT IS DESIGNED FOR QUICK DISCONNECT/CONNECT. IT IS CIRCULAR IS SHAPE WITH AN OUTSIDE DIAMETER OF 5.0 INCHES AND AN INSIDE DIAMETER OF 4.25 INCHES. THE APPROXIMATE NUT THICKNESS IS 0.76 INCHES. ALL DIMENSIONS AND TOLERANCES ARE PER ANSI V14.5-1973. THREAD SIZES AND TOLERANCES ARE PER HANDBOOK H28.

(B) TEST:
QUALIFICATION/ACCEPTANCE TEST - THERE IS NO QTP/ATP FOR THE INDIVIDUAL COUPLING NUT. TESTING VERIFIED BY SIMILARITY TO EXISTING ORBITER/SPACELAB

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ECLSS COUPLING NUTS. OVERALL PERFORMANCE OF INTEGRATED SYSTEM INCLUDES THE NUT. INTEGRATED TESTING INCLUDES THE FOLLOWING:

IN-PROCESS AND ACCEPTANCE TEST - THREE SEPARATE AIR SYSTEM FLOWRATE (DUCT) TESTS PERFORMED WITH INLET PRESSURE BETWEEN 1 IN/H20 AND 3 IN/H20. (1) NOMINAL WITH NO BRANCHES BLOCKED - FLOW RATE AT MIR DIFFUSER VERIFIED TO BE 160-290 LB/HR AND FLOW RATE AT SPACELAB INTERFACE VERIFIED TO BE 170-320 LB/HR WITH INLET FLOW RATE OF 470-860 LB/HR; (2) WITH SPACELAB INTERFACE BLOCKED - FLOW RATE AT MIR DIFFUSER VERIFIED TO BE 170-300 LB/HR WITH INLET FLOW RATE OF 360-660 LB/HR; AND (3) WITH MIR DIFFUSER BLOCKED - FLOW RATE AT SPACELAB INTERFACE VERIFIED TO BE 180-320 LB/HR WITH INLET FLOW RATE OF 410-740 LB/HR.

OMRSD - TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(C) INSPECTION:
RECEIVING INSPECTION
INCOMING PARTS ARE VISUALLY INSPECTED FOR MATERIAL AND PROCESS CERTIFICATIONS.

CONTAMINATION CONTROL
CLEANING REQUIREMENTS TO GENERALLY CLEAN (GC) LEVEL. CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
ASSEMBLY AND INSTALLATION VERIFIED BY INSPECTION.

TESTING
ATP-IN PROCESS/OMRSD TESTING VERIFIED BY INSPECTION.

HANDLING/PACKAGING
PACKAGING PROCEDURES AND REQUIREMENT FOR SHIPMENT IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN PRACA DATA BASE.

(E) OPERATIONAL USE:
CREW COULD TIGHTEN A LOOSE COUPLING NUT.

- APPROVALS -

PRODUCT ASSURANCE ENGR.	:	M. W. GUENTHER	:
PAE MANAGER	:	W. R. MARLOWE	:
DESIGN ENGINEER	:	K. N. OUONG	:
CHIEF ENGINEER	:	B. J. BRANDT	:
NASA SS/MA	:		:
NASA SUBSYSTEM MANAGER	:		:
JSC MOD	:		: