PAGE: 1 PRINT DATE: 10/23/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER: M8-1MR-M016-X

SUBSYSTEM NAME: MECHANICAL - EXTERNAL AIRLOCK
REVISION: 2 9/15/95

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	KIT, EXTERNAL AIRLOCK MISSION	V828-000002
SRU :	SEAL, FEEDTHROUGH PLATE	M83248/1-381

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
EXTERNAL AIRLOCK FEEDTHROUGH PLATE BULKHEAD SEAL

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 6
SIX

FUNCTION:
A SINGLE SEAL AT EACH FEEDTHROUGH PLATE/BULKHEAD INTERFACE. IS PROVIDED AT SIX PLACES ON THE EXTERNAL AIRLOCK TO PREVENT LEAKAGE OF EXTERNAL AIRLOCK PRESSURE AT THESE INTERFACES. FMEA ALSO INCLUDES SEALING CAPABILITIES OF DYNATUBE FITTINGS LOCATED ON FEEDTHROUGH PLATES.

REFERENCE DOCUMENTS: V075-332407
V075-332421
V075-332422
V828-341046

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M8-1MR-M016-01

REVISION# 2 9/15/95

SUBSYSTEM NAME: MECHANICAL - EXTERNAL AIRLOCK
LRU: KIT, EXTERNAL AIRLOCK MISSION
ITEM NAME: SEAL, FEEDTHROUGH PLATE

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
LEAKAGE (O-RING SEAL)

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

CAUSE:
AGING/OXIDATION/SUBLIMATION, CONTAMINATION/FOREIGN OBJECT/DEBRIS, DEFECTIVE PART MATERIAL OR MANUFACTURING DEFECT, INADEQUATE/ EXCESSIVE/UNEVEN SEAL COMPRESSION LOADS, MISHANDLING, THERMAL DISTORTION

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:
INSTRUMENTATION/PHYSICAL OBSERVATION - REDUCED PRESSURE (CONSUMABLES) IN HABITABLE VOLUMES.

CORRECTING ACTION: CREW COULD ISOLATE LEAK BY CLOSING THE APPROPRIATE HATCH(S).

REMARKS/RECOMMENDATIONS:
FEED THROUGH PLATE CONTAINS A SINGLE O-RING SEAL.

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M8-1MR-M018-01

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF SEAL INTEGRITY AT ONE FEEDTHROUGH PLATE/EXTERNAL AIRLOCK INTERFACE RESULTING IN LOSS OF ISOLATION BETWEEN EXTERNAL AIRLOCK AND OUTSIDE ATMOSPHERE.

(B) INTERFACING SUBSYSTEM(S):
REDUCED CONSUMABLES IN EXTERNAL AIRLOCK, VESTIBULE TUNNEL, TUNNEL ADAPTER, INTERNAL AIRLOCK, CABIN, AND SPACELAB ENVIRONMENT (MIR 1 ONLY) WITH HATCHES "A", FIFTH, EXTERNAL AIRLOCK AFT (MIR 1 ONLY), AND EXTERNAL AIRLOCK UPPER OPEN. EXTERNAL LEAKAGE WOULD NOT EXCEED AIR MAKEUP CAPABILITY OF ORBITER ATMOSPHERIC REVITALIZATION PRESSURE CONTROL SYSTEM.

(C) MISSION:
POSSIBLE EARLY MISSION TERMINATION IF SECOND SEAL FAILURE OCCURS PRIOR TO DOCKING WITH MIR OR PRIOR TO COMPLETION OF IVA. LOSS OF CAPABILITY TO PERFORM PLANNED EVA.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT FIRST FAILURE. POSSIBLE LOSS OF CREW IF SECOND FEEDTHROUGH PLATE SEAL FAILURE OCCURS DURING IVA AND EXCESSIVE LEAKAGE CANNOT BE ISOLATED.

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FEEDTHROUGH PLATE SEAL FAILURE - SLIGHT LEAKAGE OF PRESSURE TO OUTSIDE ATMOSPHERE.

SECOND SINGLE SEAL FAILURE WITHIN HABITABLE VOLUME - EXCESSIVE LOSS OF HABITABLE PRESSURE WITH ALL HATCHES OPEN. SAFETY OF ORBITER AND MIR CREW AND VEHICLE JEOPARDIZED UPON LOSS OF CONSUMABLES. POSSIBLE LOSS OF PRESSURE IN MIR IF SECOND FAILURE OCCURS WHILE EXTERNAL AIRLOCK UPPER HATCH IS OPEN.

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

(F) RATIONALE FOR CRITICALITY DOWNGRADE:
THIRD & FOURTH FAILURES (INABILITY TO CLOSE CREW CABIN HATCH & FIFTH HATCH) - LOSS OF CAPABILITY TO ISOLATE EXTERNAL LEAKAGE OF HABITABLE PRESSURE FROM CREW CABIN COULD RESULT IN LOSS OF CREW AND VEHICLE.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: HOURS TO DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: MINUTES

TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: SECONDS TO MINUTES

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

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL FAILURE MODE
NUMBER: M8-1MR-M016-01

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW WOULD HAVE SUFFICIENT TIME TO CLOSE APPROPRIATE HATCH(S) TO ISOLATE LEAKAGE FROM THE CREW CABIN VOLUME BEFORE EXCESSIVE LEAKAGE BECAME CATASTROPHIC.

HAZARDS REPORT NUMBER(S): ORBI 511

HAZARD(S) DESCRIPTION:
LOSS OF HABITABLE PRESSURE.

- APPROVALS -

PRODUCT ASSURANCE ENGR.	:	M. W. GUENTHER	:
DESIGN ENGINEER	:	T. S. COOK	: