

FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER: EMU-AN-02

ORIGINATOR: JSC

PROJECT: GFE

PART NAME: ANTENNA, EMU
PART NUMBER: SED16102842-301
LSC CONTROL NO: N/A
ZONE/LOCATION: N/A

LRU/ORU PART NUMBER: SED16102842-301
LRU/ORU PART NAME: ANTENNA, EMU
DRAWING/REF DESIGNATOR: SEE P/N
EFFECTIVITY/AFFECT STAGE: N/A

QUANTITY: : 1
SYSTEM: EMU
SUBSYSTEM: SSCS

CRITICAL ITEM: YES
CRITICALITY CATEGORY: 2/2

CRITICALITY:

SUCCESS PATHS: 1
SUCCESS PATH REMAINING: 0

END ITEM NAME: Antenna Assy, EMU Antenna-SSCS/EMU Antenna to SSER Coaxial Cable
END ITEM FUNCTIONAL: Space to Space communications
END ITEM CAPABILITY: EMU
END ITEM FAILURE TOLERANCE: 1

REDUNDANCY SCREENS:

- A. C/O PRELAUNCH: N/A
- B. DETECTION FLIGHT CREW: N/A
- C. LOSS OF REDUNDANCY FROM SINGLE CAUSE: N/A

FUNCTION: The EMU Antenna/EMU Antenna to SSER Coaxial Cable provides reception and transmission of RF communications between the EMU and orbiter.

FAILURE MODE CODE: N/A

FAILURE MODE: Open - Center conductor

CAUSE: Contamination, Vibration, Shock Thermal Extreme, Mishandling.

REMAINING PATHS: 0 - Loss of EVA Comm does not result in loss of life or vehicle.

EFFECT/ MISSION PHASE: Operations.

CORRECTIVE ACTION: Terminate EVA

-FAILURE EFFECTS-

END ITEM/LRU/ORU/ASSEMBLY: Transmit and receive capability degraded. (Criticality assumes degradation renders antenna unusable)

SUBSYSTEM/NEXT ASSEMBLY/INTERFACE: N/A.

SYSTEM/END ITEM/MISSION: Terminate EVA due to loss of communication

CREW/VEHICLE : EVA crew member - loss of communication.

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SUBSYSTEM: SSCS

HAZARD INFORMATION:

HAZARD: Yes
HAZARD ORGANIZATION CODE: TBD
HAZARD NUMBER: See JSC 27495 - EMU-AN-1004

TIME TO EFFECT: Seconds
TIME TO DETECT: Seconds
TIME TO CORRECT: Minutes
FAILURE DETECTION/FLIGHT: Audible

REMARKS:

Caution and Warning function of EVC is not affected.

-RATIONALE FOR ACCEPTABILITY-

(A) DESIGN: The antenna/EMU Antenna to SSER Coaxial Cable is electrically passive and has no electrical connections to the EMU frame. Also there are no moving or operating mechanical parts. Materials and processes are approved by JSC Materials Branch. Reference memos MATL-97-120 and MATL-97-264.

(B) TEST:

(1) Qualification: Certification testing conducted in accordance with Qualification Test Plan JSC 27478

One-Time test on Qual. model antenna. Antenna/EMU Antenna to SSER Coaxial Cable performance verified before and after environmental exposure.

Temperature - 4 1/2 cycles at +250°F to -65°F with antenna VSWR measured at the peak of each cycle. Reference TPS 5G9620055. Qualification Thermal Vacuum Test and Vacuum Power Handling Test - Unit operated in chamber evacuated to 10-6 TORR with RF power handling capability measured during thermal vac. The thermal range will be +121°C to -54°C with the final cycle to -156°C. Reference TPS 8Q9620167. Salt-Fog, Humidity and fungus are certified by analysis.

(2) Manufacturing Acceptance Tests:

Temperature - 1 1/2 cycles in accordance with JSC 27473 with VSWR verified during test. Reference TPS 8Q9620168.

(3) Ground Turnaround Test:

Comm/Biomed checkout is performed prior to each vacuum chamber test sequence and prior to delivery for flight. Ref. P528/SEMU-016.

Orbiter/EMU functional checkout (REF. V1103) is performed at vehicle installation.

Transmit and receive functions are verified in each of these tests.

(C) INSPECTION: Inspections are performed as part of final acceptance during PDA/PIA, and during turnaround and vehicle installation (REF. V1103).

(D) FAILURE HISTORY: No flight history for this part number

(E) OPERATIONAL USE: Flight rules define minimum Comm. Terminate EVA upon loss of COMM. Reference Space Shuttle Operational Flight Rules - Vol A All Flights: A15.1.1-7, "Min RF Comm Definition." A15.1.22-2E, "EMU Go - No Go Criteria"

PREPARED BY: J. Ngo

REVISION: Baseline

DATE: 1/8/98

WAIVER NUMBER: