

CRITICAL ITEMS LIST

SYSTEM: EXTRAVEHICULAR MOBILITY UNIT SUBSYSTEM: SPACE TO SPACE COMMUNICATIONS SYSTEM

ASSEMBLY: SPACE TO SPACE EMU RADIO (SSER) ASSY P/N: SDD16102589

APPROVAL DATE:
SUPERSEDES REV: N/A DATE: N/A
SHEET 1 OF 4

FUNCTIONAL EFFECTIVITY: OV102, OV103, OV104, OV105 AND SUBS

PREPARED BY: Nancy A Olson DATE: 12/06/96

APPROVAL

SR&MA:
DESIGN:
SSCS PROJECT MANAGER:

Wade Chan
Olson

DATE:
DATE: 6/30/96
DATE: 6/30/96

CRITICALITY(H/F): 2/2 INTACT ABORT MODE CRIT: N/A

REDUNDANCY SCREENS: A-N/A B-N/A C-N/A

FMEA REFERENCE: SSER-17

NAME: SSER

DRAWING REFERENCE: SDD16102580, SDD16102601, SDD16102639, SDD16102561

QUANTITY: 1

| CI # | REV | FUNCTION | FAILURE MODE AND CAUSE | FAILURE EFFECT | RATIONALE FOR ACCEPTABILITY |
|---------|-------|---|--|--|--|
| SSER-17 | BASIC | <p>1. Provides RF Duplex voice communications between the EML and Orbiter, other EMUs, and the Space Station</p> <p>2. Provides telemetry from LMU to Orbiter or Station</p> <p>3. Provides caution and status tone and CA on command from EML caution and warning system</p> <p>4. Provides Hardline voice communication between LMU and Orbiter or Station in flight</p> <p>MISSION PHASE: Pre-EVA, EVA, Post-EVA</p> | <p>FAILURE MODE: Push to Talk input shorted to ground</p> <p>CAUSE: Contamination, vibration, shock, EEE parts failure, or temperature cycle</p> <p>MISSION PHASES: Pre-EVA, EVA, Post-EVA</p> | <p>SUBSYSTEM: Loss of transmit voice to Orbiter, Station, and other EMUs in ALT and PRI modes. Loss of capability to change frequency in ALT and PRI modes</p> <p>Continuous keying in Hardline mode</p> <p>INTERFACING SUBSYSTEMS: When the SSER is in Hardline mode, the Orbiter audio system is continuously keyed. Anticox PTT function is continuously on.</p> <p>MISSION: Terminate EVA</p> <p>CREW/VEHICLE: Loss of transmit audio for EVA Crewman.</p> <p>SUCCESS PATHS REMAINING AFTER INSTALLATION: 0</p> <p>FMELE EFFECT: 0 seconds</p> | <p>DESIGN: The electrical design of the SSER is based upon JSC in-house engineering model hardware. Litton is manufacturing the hardware in accordance with the appropriate NHB 5300.4 standards.</p> <p>Passive EEE parts are selected from the guidelines of MIL-STD-975. Active EEE parts are approved by the JSC Engineering Directorate Certified Parts Approval Process.</p> <p>The PTT input line is brought into the SSER through a Bendix 10-550354-35P miniature guide disconnect, bayonet lock connector M22759 wire is run from the Bendix Connector to an EMI filter connector (56-726-003 from Spectrum Control) and then to the PRI and ALT signal processors. Splices are made in accordance with Rockwell specification ME416-0031-1004. The cables are laced to avoid strain. The PTT signal is brought to the Modem/Signal Processor Power converter for the Hardline mode through a SAMTEC SSQ-112-23-S-D stackable connector. The PTT circuits on the PRI and ALT signal processors and the Modem/Signal Processor Power Converter are isolated through the use of Q83551 CMOS switches from Quality Semiconductor which are rated to operate from -55°C to 175°C. The SSER is environmentally sealed to avoid contamination. The signal processor and modem/signal processor power converter boards are conformally coated to avoid contamination.</p> |

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SYSTEM: EXTRAVEHICULAR MOBILITY UNIT SUBSYSTEM: SPACE TO SPACE COMMUNICATIONS SYSTEM

ASSEMBLY: SPACE TO SPACE EMU RADIO (SSER) ASSY P/N: SED16102580

APPROVAL DATE:
SUPERCEDES REV: N/A DATE: N/A
SHEET 2 OF 4

END ITEM EFFECTIVITY: OV102, OV103, OV104, OV105 AND SUBS.

PREPARED BY: Nanci A. Olson DATE: 12/06/96

APPROVAL:

SR&MA: _____ DATE: _____
DESIGN: _____ DATE: _____
SSCS PROJECT MANAGER: _____ DATE: _____

CRITICALITY(H/P): 2/2 INTACT ABORT MODE CRIT: N/A

REDUNDANCY SCREENS: A-N/A B-N/A C-N/A

FMEA REFERENCE: SSER-17

NAME: SSER

DRAWING REFERENCE: SED16102580, SID16102601, SID16102630, SID16102561

QUANTITY: 1

| CIL # | REV | FUNCTION | FAILURE MODE AND CAUSE | FAILURE EFFECT | RATIONALE FOR ACCEPTABILITY |
|---------|-------|---|---|--|--|
| SSER-17 | BASIC | <p>1. Provides RF Duplex voice communications between the EMU and Orbiter, other EMUs, and the Space Station</p> <p>2. Provides telemetry from EMU to Orbiter or Station</p> <p>3. Provides mission and status tone to CCA on command from EMU caution and warning system.</p> <p>4. Provides Hardline voice communication between EMU and Orbiter or Station in Airlock</p> <p>MISSION PHASE: Pre-EVA, EVA, Post-EVA</p> | <p>FAILURE MODE: Push to Talk input shorted to ground</p> <p>CAUSE: Contamination, vibration, shock, EEE parts failure, or temperature cycle</p> <p>MISSION PHASE: Pre EVA EVA Post EVA</p> | <p>SUBSYSTEM: Loss of transmit voice to Orbiter, Station, and other EMUs in ALT and PRI modes. Loss of capability to change frequency in ALT and PRI modes. Continuous keying in Hardline mode.</p> <p>INTERFACING SUBSYSTEMS: When the SSER is in Hardline mode, the Orbiter audio system is continuously keyed. Airlock PTT function is continuously on.</p> <p>MISSION: Terminate EVA.</p> <p>CREW/VEHICLE: Loss of transmit audio for EVA Crewman</p> <p>SUCCESS PATHS REMAINING AFTER FIRST FAILURE: 0</p> <p>TIME TO EFFECT: seconds</p> | <p>TEST: CERTIFICATION: One time test on Qual SSER. Audio and RF are verified before, during, and after exposure to environments.</p> <p>QUALIFICATION THERMAL VACUUM TEST: 7 cycles from 15F to 140F operating and 1 cycle to -65F non-operating. Chamber evacuated to 1X10⁻⁶ torr throughout test. RF output power and audio measured at temperature extremes.</p> <p>SHOCK: Beach bundling 4 inch drop test on each corner.</p> <p>Landing shock and acceleration environments certified by analysis.</p> <p>VIBRATION: Test-induced (QAVT) - 5 minutes per axis. 20 to 80 Hz - increasing 3 dB/oct 80 to 350 Hz - constant 0.067 g²/Hz 350 to 2000 Hz - decreasing 3 dB/oct Flight-induced - 24 minutes per axis 20 to 150 Hz - increasing 6 dB/oct 150 to 1000 Hz - constant 0.03 g²/Hz 1000 to 2000 Hz - decreasing 6 dB/oct Audio and RF verified before and after each vibration test.</p> |

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APPROVAL DATE:

SUPERSEDES REV: N/A DATE: N/A

SHEET 3 OF 4

END ITEM EFFECTIVITY: OV102, OV103, OV104, OV105 AND SUBS.

PREPARED BY: Nanci A. Olson

DATE: 12/06/96

APPROVAL:

SR&MA:

DESIGN:

SSCS PROJECT MANAGER:

DATE:

DATE:

DATE:

CRITICALITY(H/F): 2/2

INTACT ABORT MODE CRIT: N/A

REDUNDANCY SCREENS: A-N/A B-N/A C-N/A

FMEA REFERENCE: SSER-17

NAME: SSER

DRAWING REFERENCE: SED16102580, SID16102601, SID16102639, SID16102561

QUANTITY: 1

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| SSER-17 | BASIC | <p>1. Provides RF Duplex voice communications between the EMU and Orbiter, other EMUs, and the Space Station</p> <p>2. Provides telemetry from EMU to Orbiter or Station</p> <p>3. Provides caution and status tone to CCA on command from EMU caution and warning system.</p> <p>4. Provides Hardline voice communication between EMU and Orbiter or Station in Airlock</p> <p>MISSION PHASE: Pre-EVA, EVA, Post-EVA</p> | <p>FAILURE MODE: Push to Talk input shorted to ground</p> <p>CAUSE: Contamination, vibration, shock, BEE parts failure, or temperature cycle</p> <p>MISSION PHASES: Pre EVA EVA Post EVA</p> | <p>SUBSYSTEM: Loss of transmit voice to Orbiter, Station, and other EMUs in ALT and PRI modes. Loss of capability to change frequency in ALT and PRI modes.</p> <p>Continuous keying in Hardline mode.</p> <p>INTERFACING SUBSYSTEMS: When the SSER is in Hardline mode, the Orbiter audio system is continuously keyed. Airlock PTT function is continuously on.</p> <p>MISSION: Terminate EVA.</p> <p>CREW/VEHICLE: Loss of transmit audio for EVA Crewman.</p> <p>SUCCESS PATHS REMAINING AFTER FIRST FAILURE: 0</p> <p>TIME TO EFFECT, seconds</p> | <p>TEST: (CONTINUED)</p> <p>Salt-fog, humidity, and fungus certified by analysis to requirements of JSC26789 (SSER Specification)</p> <p>ACCEPTANCE:</p> <p>TEMPERATURE - One and one-half cycles from 20F to 120F, with power output measured at temperature extremes.</p> <p>VIBRATION - 1 Minute per axis minimum 20 to 80 Hz - increasing 3 dB/oct 80 to 350 Hz - constant 0.64 g²/Hz 350 to 2000 Hz - decreasing 3 dB/oct Audio and RF output measured before and after each axis.</p> <p>PREINSTALLATION ACCEPTANCE TEST - Performed periodically at JSC prior to delivery of SSER for EMU installation. Includes complete electrical performance with RF output power and audio measured.</p> <p>GROUND TURNAROUND TEST: Turnaround checkout testing is accomplished in accordance with the OMRSD (V66). Functional verification of hardline and audio/rf in airlock</p> |

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APPROVAL DATE:
SUPERCEDES REV N/A DATE: N/A
SHEET 4 OF 4

END ITEM EFFECTIVITY: OV102, OV103, OV104, OV105 AND SUBS.

PREPARED BY: Nanci A. Olson

DATE: 12/06/96

APPROVAL:

SR&MA:

DESIGN:

SSCS PROJECT MANAGER:

DATE: _____

DATE: _____

DATE: _____

CRITICALITY(R/F): 2/2

INTACT ABORT MODE CRIT: N/A

REDUNDANCY SCREENS: A-N/A B-N/A C-N/A

FMEA REFERENCE: SSER-17

NAME: SSER

DRAWING REFERENCE: SED16102580, SID16102601, SID16102639, SID16102561

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|---------|-------|---|--|---|--|
| SSER-17 | BASIC | <p>1. Provides RF Duplex voice communications between the EMU and Orbiter, other EMUs, and the Space Station</p> <p>2. Provides telemetry from EMU to Orbiter or Station</p> <p>3. Provides caution and status tone to CCA on command from EMU caution and warning system.</p> <p>4. Provides Hardline voice communication between EMU and Orbiter or Station in Airtack</p> <p>MISSION PHASE: Pre-EVA, EVA, Post EVA</p> | <p>FAILURE MODE: Push to Talk input shorted to ground</p> <p>CAUSE: Contamination, vibration, shock, EEE parts failure, or temperature cycle</p> <p>MISSION PHASES: Pre EVA EVA Post EVA</p> | <p>SUBSYSTEM: Loss of transmit voice to Orbiter, Station, and other EMUs in ALT and PRI modes. Loss of capability to change frequency in ALT and PRI modes.</p> <p>Continuous keying in Hardline mode.</p> <p>INTERFACING SUBSYSTEMS: When the SSER is in Hardline mode, the Orbiter audio system is continuously keyed. Airtack PTT function is continuously on.</p> <p>MISSION: Terminate EVA.</p> <p>CREW/VEHICLE: Loss of transmit audio for EVA Crewman</p> <p>SUCCESS PATHS REMAINING AFTER FIRST FAILURE: 0</p> <p>TIME TO EFFECT, seconds</p> | <p>INSPECTION: The SSER is manufactured in accordance with an approved Quality Assurance Plan. Subassemblies are inspected for conformance with released drawings and standards for parts placement, soldering, and cleanliness.</p> <p>FAILURE HISTORY: NONE. There have been no failures of this type through qualification and initial flight unit production. Current data on test failures, flight failures, unexplained anomalies, and other failures experienced during ground processing activity can be found in the PRACA database.</p> <p>OPERATIONAL USE: Crew is trained to terminate EVA upon loss of minimum required EVA communications. Flight rules defines minimum required EVA communications.</p> |