

CRITICAL ITEMS LIST

ASSY NOMENCLATURE: RMS IFM D&C KIT

SYSTEM: REMOTE MANIPULATOR SYSTEM

REVISION: 8

ASSY P/N: SED33103306-304

SUBSYSTEM: RMS IFM D&C KIT

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FMEA		NAME, QTY & DRAWING REF DESIGNATION	CRIT'Y/ REDUND SCREENS	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
6090	B	EE COMMAND SIGNAL CIRCUIT, QTY. 1 (SET OF RESISTOR (R2), ZENER DIODES (D3, D4), AND CAPACITOR (C2)) SIE33103307	I/1 A - N/A B - N/A C - N/A	<p>Mode: Short circuit of zener diode D4</p> <p>Cause: <ul style="list-style-type: none"> • structural failure • mechanical stress • vibration • electrical stress • resistor R2 fails short. </p>	<p>Loss of ability to capture or rigidize EE. Capture command will give release command. Rigidize command will give derigidize command. Release and derigidize commands will be normal</p> <p><u>Worst Case</u> Unexpected payload motion. Incomplete rigidization. Crew action required</p>	<p>1. DESIGN The part is a glass encased, silicon zener diode, type 1ANTX 1N753A, manufactured by Motorola and qualified to MIL-S-19500. Resistor R2 is a fixed, wire wound, established reliability part, type RWR 8957500 FR, manufactured by Dale and qualified to MIL-R-39007.</p> <p>2. TEST a. QUALIFICATION/CERTIFICATION</p> <p>(1) The zener diode is qualified to MIL-S-19500/127 by Motorola. This resistor is qualified to MIL-R-39007 by Dale.</p> <p>(2) The zener diode and resistor, while installed in the RMS IFM D&C kit, have been subjected to the following qualification environmental tests: Vibration: X, Y, and Z axes - duration 15 min /axis. Spectrum: 20 to 80 Hz +3 db/Oct. 80 to 350 Hz 0.067 g²/Hz 350 to 2000 Hz -3 db/Oct. Shock: 20 g sawtooth pulse, 11 ms duration, 3 axes (6 directions)</p> <p>b. ACCEPTANCE</p> <p>The zener diode and resistor, while installed in the RMS IFM D&C kit, have been subjected to the following acceptance environmental tests: Vibration: X, Y, and Z axes - duration 3 min /axis. Spectrum: 20 to 80 Hz +3 db/Oct. 80 to 350 Hz 0.04 g²/Hz 350 to 2000 Hz -3 db/Oct. Shock: 20 g sawtooth pulse, 11 ms duration, 3 axes (6 directions)</p> <p>c. TURNAROUND</p> <p>The RMS IFM D&C kit is visually inspected for damage between missions and will be functionally tested before every mission to assure readiness for use.</p>

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ASSY NOMENCLATURE: RMS IFM D&C KIT

SYSTEM: REMOTE MANIPULATOR SYSTEM

REVISION: 8

ASSY P/N: SED310330E-304

SUBSYSTEM: RMS IFM D&C KIT

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CRITICAL ITEMS LIST

FMEA		NAME, QTY & DRAWING REF DESIGNATION	CRIT'Y/ REDUND SCREENS	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
6090	B	EE COMMAND SIGNAL CIRCUIT, QTY. 1 (SET OF RESISTOR [R2], ZENER DIODES [D3, D4], AND CAPACITOR [C2]) SIE3103307	1/1 A - N/A B - N/A C - N/A	Mode: Short circuit of zener diode D4 Cause: • structural failure • mechanical stress • vibration • electrical stress • resistor R2 fails short	Loss of ability to capture or rigidize EE. Capture command will give release command. Rigidize command will give derigidize command. Release and derigidize commands will be normal <u>Worst Case</u> Unexpected payload motion. Incomplete rigidization. Crew action required	<p>3. <u>INSPECTION.</u></p> <p>a. The zener diodes are inspected during manufacture to the requirements of MIL-5-19500. The resistors are inspected during manufacture to the requirements of MIL-R-39007.</p> <p>b. Receiving inspection verifies: (1) that the zener diodes and resistor received are as identified in the procurement documents, (2) that no physical damage has occurred to the zener diodes or resistors during shipment, (3) that the receiving documents provide adequate traceability information, and (4) acceptance test data identify acceptable parts.</p> <p>c. Parts are inspected throughout manufacture and assembly as appropriate to the manufacturing stage completed. These inspections include: (1) component mounting to the front panel of the kit, (2) soldering components, (3) wire routing, (4) stress relief of wires, etc.</p> <p>d. A test readiness review, which includes verification of test personnel, test documents, test equipment calibration/validation status, and hardware configuration, is convened by the Quality Assurance and Engineering Division in conjunction with the Engineering Directorate and Reliability and Maintainability Division.</p> <p>e. Acceptance Test Procedure (ATP) is observed and verified per procedure.</p> <p>4. <u>FAILURE HISTORY.</u></p> <p>There have been no failures associated with this failure mode on the RMS IFM D&C kit program. NSTS Program part failure history indicates no reported failures for this device. A review of GIDEP prior military part failure history reveals that no uncorrected generic issues exist.</p> <p>5. <u>OPERATIONAL EFFECTS.</u></p> <p>Unable to capture or rigidize EE. If failure occurs during rigidization sequence, carriage will not completely rigidize, leaving the payload only capture. Payload can rotate about grapple shaft axis and if close to vehicle could collide with vehicle causing damage.</p>

PREPARED BY: J.P. Grisham

SUPERSEDING DATE 10/89

APPROVED BY: R. L. Moore

DATE: 9/90

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ASSY NOMENCLATURE: RMS IFM D&C KIT

SYSTEM: REMOTE MANIPULATOR SYSTEM

REVISION: B

ASSY P/N: SED33103386-304

SUBSYSTEM: RMS IFM D&C KIT

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CRITICAL ITEMS LIST

FMEA		NAME, QTY & DRAWING REF DESIGNATION	CRIT'Y REDUND SCREENS	FAILURE MODE AND CAUSE	FAILURE EFFECT ON IND ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
6090	B	EE COMMAND SIGNAL CIRCUIT, QTY. 1 (SET OF RESISTOR (R2), ZENER DIODES (D3, D4), AND CAPACITOR (C2)) SIE33103307	1/1 A - N/A B - N/A C - N/A	Mode: Short circuit of zener diode D4 Cause: • structural failure • mechanical stress • vibration • electrical stress • resistor R2 fails short	Loss of ability to capture or rigidize EE. Capture command will give release command. Rigidize command will give derigidize command. Release and derigidize commands will be normal <u>Worst Case</u> Unexpected payload motion. Incomplete rigidization. Crew action required	<p>6. <u>CREW ACTION.</u></p> <p>The "RIGID/DERIGID" switch should be set to "OFF". Crew should observe the capture/rigidize sequence and determine that the grapple fixture has been drawn far enough into the EE to prohibit payload rotations. If the interface does not appear rigid, release the payload using the "CAPTURE/RELEASE" switch. If snares open, maneuver arm away from payload. If snares do not open, attempt to release in backup mode. If snares open, maneuver arm away from payload. Maneuver Orbiter away from payload. If snares cannot be opened, then jettison arm/payload combination.</p> <p>7. <u>CREW TRAINING.</u></p> <p>Crew to be trained to recognize off nominal operation of the EE and to remove commands, or power to the RMS IFM D&C kit as required and to maneuver the Orbiter away from a free payload at any time during arm operations</p> <p>8. <u>MISSION CONSTRAINT.</u></p> <p>When capturing a free flying payload, the EE must be far enough away from structure to prohibit contact regardless of payload rotations.</p>

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