

ASSY NOMENCLATURE: RMS IFM D&C KIT

SYSTEM: REMOTE MANIPULATOR SYSTEM

REVISION: 8

ASSY P/N: SED33183306-204

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 ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
6050	8	RIGIDIZE/ DERIGIDIZE SWITCH (S2) MS90310-271	1/1 A - N/A B - N/A C - N/A	Mode: Fails open, premature open, short to case Cause: • structural failure • contamination • mechanical shock • vibration	Loss of rigidize and/or derigidize capability. <u>Wgr. Case</u> Unexpected payload motion. Incomplete rigidization. crew action required	<p>1. <u>DESIGN</u></p> <p>The toggle switch is manufactured by Cutler-Hammer to meet MIL specification requirements and is qualified to MIL-5-8834. The toggle switch is a double pole, positive break, miniature, sealed, solder lug toggle switch.</p> <p>2. <u>TEST</u></p> <p>a. <u>MANUFACTURING</u></p> <p>The part is screened and qualified to the requirements of MIL-5-8834. Tests and inspections done on a sample from each lot are: sealing, examination of product, switching characteristics, dielectric withstanding voltage (DWV), contact voltage drop, marking permanency, solderability, mechanical endurance, electrical overload, endurance (electrical), life (20,000 cycles at rated current and rated load), low level, dry circuit and intermediate current, switching and temperature rise, overload, inductive load, resistive load, shock, and salt spray. Tests performed on a sample of devices for qualification are: examination of product, marking permanency, solderability, resistance to soldering heat, switching characteristics, strength of terminals, strength of toggle actuating lever, pivot and lever stop, strength of mounting bushing, mechanical endurance, contact voltage drop, electrical overload, endurance, low level dry circuit and intermediate current switching, and temperature rise, resistive load, inductive load, lamp load, intermediate current, life, low level temperature rise, overvoltage, contact voltage drop, short circuit closure (overload capability demonstration test), vibration, shock, salt spray, moisture resistance, toggle ice, sand and dust, thermal shock, DWV, sealing, explosion, flammability, and examination of product.</p> <p>All (100%) of the switches purchased for the RMS IFM D&C Kit are subjected to the following tests and inspections:</p> <ol style="list-style-type: none"> 1 Sealing, examination of product, switching characteristics dielectric withstanding voltage, and voltage drop (reference MIL-5-8834F, Table II, Group A). 2 Radiographic inspected for particle contamination 3 "Run-in" of 250 cycles with nominally equal on off times with a contact load of 1/10 the rated or 1 ampere maximum at 28 ± 3 volts DC at temperature of 25°C using the setup criteria described in MIL-5-8834F, para 4.8.12, items a through e. <p>All screening data will be delivered with the switches.</p>

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PROVED BY: R. J. Moore

DATE 9/80

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ASSY NOMENCLATURE: RMS IFM D&C KIT

SYSTEM: REMOTE MANIPULATOR SYSTEM

REVISION: B

ASSY P/N: SED33103306-304

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 OR END ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
6050	B	RIGIDIZE/ DERIGIDIZE SWITCH (S2) MS90310-271	1/1 A - N/A B - N/A C - N/A	Mode: Fails open, premature open, short to case Cause: • structural failure • contamination • mechanical shock • vibration	Loss of rigidize and/or derigidize capability. <u>Worst Case</u> Unexpected payload motion Incomplete rigidization crew action required.	<p>b. QUALIFICATION/CERTIFICATION.</p> <p>The switch, while installed in the RMS IFM D&C kit, has been subjected to the following qualification environmental tests:</p> <p>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.</p> <p>Shock: 20 g sawtooth pulse, 11 ms duration, 3 axes (6 directions).</p> <p>c. ACCEPTANCE</p> <p>The switch, while installed in the RMS IFM D&C kit, has been subjected to the following acceptance environmental tests:</p> <p>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.</p> <p>Shock: 20 g sawtooth pulse, 11 ms duration, 3 axes (6 directions).</p> <p>d. 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> <p>3. INSPECTION.</p> <p>a. The part is inspected to the requirements of MIL-5-8834, which includes visual inspections, and screening tests as described in paragraph B. The device manufacturer is not required to prepare and maintain a product assurance program. Government source inspection required.</p> <p>b. Receiving inspection verifies: (1) that the switches received are as identified in the procurement documents, (2) that no physical damage has occurred to the switches 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 in the manufacturing stage completed. These inspections include: (1) component mounting to the front panel of the kit, (2) soldering of contacts to switch connector, (3) wire routing, (4) stress relief of wires, etc.</p>

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PROPERTY: B / Moore

DATE: 9/90

SUPERSEDING DATE: 20189

CRITICAL ITEMS LIST

ASSY NOMENCLATURE: RMS IFM D&C KIT

SYSTEM: REMOTE MANIPULATOR SYSTEM

REVISION: 8

ASSY P/N: 5ED33103306-304

SUBSYSTEM: RMS IFM D&C KIT

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FMEA		NAME, QTY & DRAWING REF DESIGNATION	CRITY/ REDUND SCREENS	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
6050	8	RIGIDIZE/ DERIGIDIZE SWITCH (S2) MS90310-279	1/1 A - N/A B - N/A C - N/A	<p>Mode: Fails open, premature open, short to case.</p> <p>Cause: • structural failure • contamination • mechanical shock • vibration</p>	<p>Loss of rigidize and/or derigidize capability</p> <p><u>Worst Case</u> Unexpected payload motion Incomplete rigidization. crew action required.</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. FAILURE HISTORY. 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. OPERATIONAL EFFECTS. Unable to rigidize or derigidize the EE. If loss of rigidize occurs, the payload will not be completely rigidized with the EE and payload rotation around the grapple fixture grapple shaft can occur and payload may collide with the vehicle causing damage.</p> <p>6. CREW ACTION. If have loss of derigidize, can release payload without derigidizing using "CAPTURE/RELEASE" switch or backup mode. If have loss of rigidize, crew should determine if grapple fixture has been drawn far enough into the EE to prohibit payload rotation. If the payload/EE interface does not appear rigid, the payload must be released and the arm maneuvered away from the payload.</p> <p>7. CREW TRAINING. Crew to be trained to recognize off nominal operation of the EE and to remove commands and power to the RMS IFM D&C kit as required, and to maneuver the arm and/or Orbiter away from a free payload at any time during arm operation.</p> <p>8. MISSION CONSTRAINT. When capturing a free flying payload, the EE must be far enough away from structure to prohibit contact regardless of payload rotation</p>

PREPARED BY: J. P. Grisham

SUPERSEDING DATE: 10/89

APPROVED BY: R. L. Moore

DATE: 9/90

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