CRITICAL ITEMS LIST

ASSY NOMENCLATURE: *RMS IFM D&C KIT* SYSTEM: *REMOTE MANIPULATOR SYSTEM* REVISION: *B*

ASSY P/N: *SED33103306-304* SUBSYSTEM: *RMS IFM D&C KIT*

FMEA REF	FMEA REV	NAME, QTY & DRAWING REF DESIGNATION	CRIT'Y/ REDUND SCREENS	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
7D7U	B	SAFING INHIBIT SWITCH MS21026-A2-11	2/1RB A - Pass B - Fail C - Pass	Mode: Fails closed, premature closure Cause: • structural failure • contamination • mechanical shock • vibration	Safing inhibit applied to RMS resulting in loss of RMS hardwire and auto safing. Worst Case Arm runaway failures will not be automatically stopped by RMS hardwire or auto safing	1. DESIGN The toggle switch is manufactured by Cutler-Hammer to meet MIL specification requirements and is qualified to MIL-S-8834. The toggle switch is a double pole, positive break, miniature, sealed, solder lug toggle switch. 2. TEST a. MANUFACTURING The part is screened and qualified to the requirements of MIL-S-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 spra, moisture resistance, toggle ice, sand and dust, thermal shock, DWV, sealing, explosion, flammability, and examination of product. All (100%) of the switches purchased for the RMS IFM D&C kit are subjected to the following tests and inspections: 1. Sealing, examination of product, switching characteristics, dielectric withstanding voltage, and voltage drop (reference MIL-S-8834F, Table III, 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 load or 1 ampere maximum at 28 +/-3 volts DC at temperature of 25°C using the setup criteria described in MIL S 8834F, paragraph 4.8.12, items a through e. All screening data will be delivered with the switches.

PREPARED BY: *J. P. Gisham* SUPERSEDING DATE: *10/89* APPROVED BY: *R. L. Moore* DATE: 9/90

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ASSY P/N *SED33103306-304* SUBSYSTEM *RMS IFM D&C KIT* PAGE *37* OF *47*

FMEA REF	FMEA REV	NAME, QTY & DRAWING REF DESIGNATION	CRIT'Y/ REQUIND SCREENS	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
7070	B	SAFING INHIBIT SWITCH MS21026-A2-11	2/1RB A - Pass B - Fail C - Pass	Mode: Fails closed, premature closure Cause: • structural failure • contamination • mechanical shock • vibration	Safing inhibit applied to RMS resulting in loss of RMS hardwire and auto safing. Worst Case Arm runaway failures will not be automatically stopped by RMS hardware or auto safing	b. QUALIFICATION/CERTIFICATION. The switch, while installed in the RMS IFM D&C kit, has 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 g^2/Hz 350 to 2000 Hz -3 db/Oct. Shock: 20 g sawtooth pulse, 11 ms duration, 3 axes (6 directions) c. ACCEPTANCE The switch, while installed in the RMS IFM D&C kit, has 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 g^2/Hz 350 to 2000 Hz -3 db/Oct. Shock: 20 g sawtooth pulse, 11 ms duration, 3 axes (6 directions) d TURNAROUND. 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. 3. INSPECTION. a. The part is inspected to the requirements of MIL-S 8834, which includes visual inspection, 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 of the product is required. 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 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 of contacts to switch connector, (3) wire routing, (4) strain relief of wires, etc

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ASSY P/N: *SED33103306-304* SUBSYSTEM: *RMS IFM D&C KIT* PAGE *38* OF *47*

FMEA REF	FMEA REV	NAME, QTY & DRAWING REF DESIGNATION	CRIT'Y/ REDUND SCREENS	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
7070	B	SAFING INHIBIT SWITCH MS21026-A2-11	2/1RE A - Pass B - Fail C - Pass	Mode: Fails closed, premature closure Cause: • structural failure • contamination • mechanical shock • vibration	Safing inhibit applied to RMS resulting in loss of RMS hardwire and auto safing. . Worst Case Arm runaway failures will not be automatically stopped by RMS hardwire or auto safing	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 e. Acceptance Test Procedure (ATP) is observed and verified per procedure. 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. 5. OPERATIONAL EFFECTS. Absence of hardwire and auto safing for arm operations 6. CREW ACTION. Use direct drive. 7. CREW TRAINING. None. 8. MISSION CONSTRAINT. None. 9. SCREEN FAILURES. B:Path not instrumented No annunciation or display provided

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