

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: DBC PANEL

SYSTEM: DBC SUBSYSTEM
ASS'Y P/N: 51140E191

SHEET: 1

P/N REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWN / FUNC. 2/100 CRITICALITY	RATIONALE FOR ACCEPTANCE
41	1	MODE SELECT SWITCH QTY 1 P/N MC 452-0093-5106 ED 92020 SHEET 2	<p>MODE: SWITCH CONTACT CONTINUOUSLY ON DIRECT DRIVE</p> <p>CAUSE(S): (1) SHORTED DIRECT DRIVE CONTACT ON 28V WIPER.</p>	<p>NO EFFECT FOR THIS FAILURE. NO EFFECT IN DIRECT UNLESS RMS IN PARK WITH BRAKE SELECT ON AND SUBSEQUENT FAILURES TO SINGLE/DIRECT SWITCH CAUSING UNCOMMANDED MOTION.</p> <p>-----</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>-----</p> <p>REDUNDANT PATHS REMAINING</p> <p>-----</p> <p>SINGLE BACKUP A-10 AND MANUAL</p>		<p>DESIGN FEATURES</p> <p>-----</p> <p>ROTARY SWITCHES USED ON THE DBC PANEL ARE HERMETICALLY SEALED, AND OF A MATURE AND PROVEN DESIGN. THESE SWITCHES ARE IN COMMON USE ON THE ORBITER VEHICLE.</p> <p>THE SWITCHES ARE CONTROLLED BY ROCKWELL INTERNATIONAL SPECIFICATION MC 452-0049 AND HAVE BEEN QUALIFIED TO THE REQUIREMENTS OF THIS SPECIFICATION.</p> <p>ELECTRICAL CONNECTIONS TO THE SWITCH ARE ACHIEVED BY MEANS OF A MATING PAIR OF MB TYPE CIRCULAR CONNECTORS USING CRIMP STYLE CONTACTS. WIRING TO SWITCH CONNECTOR UTILIZES NICKEL PLATED CONDUCTORS WITH A POLYARIDE INSULATION. THE WIRING HARNESS IS DESIGNED TO BE CAPABLE OF SEPARATE TESTING (FOR INSULATION RESISTANCE DIELECTRIC STRENGTH, AND CONTINUITY).</p> <p>THIS SWITCH IS MOUNTED TO THE DBC PANEL BY MEANS OF THREE 6-32 FASTENERS. AFTER INSTALLATION AND TORQUING EACH SCREW HEAD IS STAKED TO THE PANEL USING A BLOB OF EPOXY ADHESIVE. A DOWEL PIN, INTEGRAL TO THE SWITCH BODY, ENGAGES WITH THE PANEL TO PROVIDE ROTATION RESTRAINT. ANALYSIS OF THE BASIC PANEL STRUCTURE HAS DEMONSTRATED THAT THERE ARE NO RESONANCES IN THE RELEVANT VIBRATION FREQUENCY SPECTRUM. THIS ANALYSIS HAS BEEN VERIFIED BY VIBRATION TESTING OF THE DBC PANEL ASSEMBLY. APPLICATION ANALYSIS HAS CONFIRMED THAT ADEQUATE ELECTRICAL STRESS MARGINS ARE ACHIEVED.</p> <p>AT THE PART LEVEL, QUALIFICATION/CERTIFICATION TESTING IS DEFINED BY ROCKWELL INTERNATIONAL SPECIFICATION MC452-0049. THIS TEST REQUIREMENT INCLUDES: INSULATION RESISTANCE, CONTACT DROP AT RATED CURRENT, RANDOM VIBRATION (40 MINUTES PER AXIS), SHOCK (20G-3 AXES), 25000 CYCLES ACTIVATION AT RATED DC CURRENT, LEAKAGE AT ONE ATMOSPHERE DIFFERENTIAL PRESSURE. FOR SWITCH OPERATIONAL CYCLES REFER TO TABLE 13.</p> <p>ALL UNITS ARE SUBJECTED TO ACCEPTANCE TESTS WHICH INCLUDE PRE-ACCEPTANCE RUN-IN, DIELECTRIC WITHSTANDING VOLTAGE, CONTACT RESISTANCE, ACCEPTANCE VIBRATION, SEAL TEST, VISUAL EXAMINATION AND FINAL PERFORMANCE TEST.</p>

PREPARED BY: WMC SUPERCEDING DATE: 21 OCT 87 APPROVE

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: D&C PANEL

SYSTEM: D&C SUBSYSTEM
ASS'Y P/N: 51140E191

SHEET: 2

AREA REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	MDM / FUNC. 2/1RD CRITICALITY	RATIONALE FOR ACCEPTANCE
41	1	MODE SELECT SWITCH QTY 1 P/N ME 452-0093-5106 ED 92020 SHEET 2	MODE: SWITCH CONTACT CONTINUOUSLY ON DIRECT DRIVE CAUSE(S): (1) SHORTED DIRECT DRIVE CONTACT ON 28V WIPER.	NO EFFECT FOR THIS FAILURE. NO EFFECT IN DIRECT UNLESS RMS IN PARK WITH BRAKE SELECT ON AND SUBSEQUENT FAILURES TO SINGLE/DIRECT SWITCH CAUSING UNCOMMANDED MOTION. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING SINGLE, BACKUP, AUTO AND MANUAL		ACCEPTANCE TESTS ----- THE HARDWARE ITEM IS SUBJECT TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTS AS PART OF THE D&C PANEL ASSEMBLY. O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 1 O THERMAL: +110 DEGREES F TO PLUS 10 DEGREES F (2 CYCLES - 9.5 HRS/CYCLE.) THE D&C PANEL ASSEMBLY IS FURTHER TESTED AS PART OF THE RMS SYSTEM TESTS (TP518 RMS STRONGBACK TEST AND TP552 FLAT FLOOR TEST) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE. QUALIFICATION TESTS ----- THE SWITCH ITEM HAS BEEN QUALIFIED FOR ORBITER USE. THE D&C PANEL ASSEMBLY HAS BEEN SUBJECT TO THE FOLLOWING QUALIFICATION TEST ENVIRONMENTS. O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 1 O SHOCK: 20G/11 MS - 3 AXES (6 DIRECTIONS) O THERMAL: 110 DEGREES F TO -23 DEGREES F (12 HRS PER CYCLE) (6 CYCLES) O HUMIDITY: 95% (120 DEGREES F TO 82 DEGREES F CYCLE IN 16 HRS) 10 CYCLES TOTAL. O EMC: MIL-STD-461 AS MODIFIED BY SL-E-0002 (TEST C01, C02, C03, CS01 (DC/AC), C01, CS01 (DC/AC), C502, C506, RE02 (B/W), RS02, RS03, RS04) FLIGHT CHECKOUT ----- PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987

PREPARED BY: RMG

SUPERSEDING DATE: 21 OCT 87

APPROVED BY: _____

RMS/D&C 12

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: DBC PANEL

SYSTEM: DBC SUBSYSTEM
ASS'Y P/N: 517502791

SHEET: 3

P/N REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HWR / FUNC. 2/1RD CRITICALITY	RATIONALE FOR ACCEPTANCE
41	1	MODE SELECT SWITCH QTY 1 P/N MC 452-0093-5106 ED 92020 SHEET 2	<p>MODE: SWITCH CONTACT CONTINUOUSLY ON DIRECT DRIVE</p> <p>CAUSE(S): (1) SHORTED DIRECT DRIVE CONTACT ON 28V WIPER.</p>	<p>NO EFFECT FOR THIS FAILURE. NO EFFECT IN DIRECT UNLESS RMS IN PARK WITH BRAKE SELECT ON AND SUBSEQUENT FAILURES TO SINGLE/DIRECT SWITCH CAUSING UNCOMMANDED MOTION.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING</p> <p>SINGLE BACKUP, AUPD AND MAJMAL</p>	<p>QA/INSPECTIONS</p>	<p>HERMETICALLY SEALED ROTARY SWITCHES ARE PROCURED TO ROCKWELL SPECIFICATION MC452-0049, AS REQUIRED BY CAE SPEC. PS 87840. CAE PART NO. PS87840. QUALIFICATION AND ACCEPTANCE TESTING OF SWITCHES IS PERFORMED TO RI. SPEC. MC452-0049.</p> <p>RECEIVING INSPECTION VERIFIES THAT SWITCHES RECEIVED ARE AS IDENTIFIED IN THE PROCUREMENT DOCUMENTS, THAT NO PHYSICAL DAMAGE HAS OCCURRED TO SWITCHES DURING SHIPMENT, THAT THE RECEIVING DOCUMENTS PROVIDE ADEQUATE TRACEABILITY INFORMATION AND ACCEPTANCE TEST DATA IDENTIFIES ACCEPTABLE PARTS.</p> <p>PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE:</p> <p>COMPONENT MOUNTING TO FRONT PANEL INSPECTION, CRIMPING OF CONTACTS TO SWITCH CONNECTOR, WIRE ROUTING, STRESS RELIEF OF WIRES ETC. OPERATORS AND INSPECTORS TRAINED AND CERTIFIED FOR CRIMPING AND SOLDERING OPERATIONS TO CAE SPEC PD 90165.01 AND NASA MHD 5300.4 (3A) STANDARD, AS MODIFIED BY JSC 08B00A.</p> <p>PRE-TEST INSPECTION OF DBC PANEL ASSY INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILD CONFIGURATION VERIFICATION TO AS DESIGN ETC. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)</p> <p>A TEST READINESS REVIEW (TRR) WHICH INCLUDES VERIFICATION OF TEST PERSONNEL, TEST DOCUMENTS, TEST EQUIPMENT CALIBRATION/ VALIDATION STATUS AND HARDWARE CONFIGURATION IS CONVENED BY QUALITY ASSURANCE IN CONJUNCTION WITH ENGINEERING RELIABILITY CONFIGURATION CONTROL, SUPPLIER AS APPLICABLE, AND THE GOVERNMENT REPRESENTATIVE PRIOR TO THE START OF ANY FORMAL TESTING (ACCEPTANCE OR QUALIFICATION).</p> <p>ACCEPTANCE TESTING (ATP) INCLUDES AMBIENT PERFORMANCE, THERMAL AND VIBRATION TESTING. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT).</p> <p>INTEGRATION OF DBC PANEL, RHC, THC AND MCIU, INSPECTIONS ARE PERFORMED AT EACH STAGE OF INTEGRATION, WHICH INCLUDES GROUNDING CHECKS, INTER CONNECT CABLE VERIFICATION, CONNECTOR INSPECTION FOR BENT OR PUSHBACK CONTACTS ETC.</p> <p>SUB-SYSTEM PERFORMANCE TESTING (ATP) INCLUDES AN AMBIENT PERFORMANCE TEST. (MANDATORY INSPECTION POINT).</p> <p>SRMS SYSTEMS INTEGRATION. THE INTEGRATION OF MECHANICAL AND SUBASSEMBLIES AND THE FLIGHT CABIN EQUIPMENT TO FORM THE SRMS. INSPECTIONS ARE PERFORMED AT EACH PHASE OF INTEGRATION WHICH INCLUDES GROUNDING CHECKS, THRU WIRING CHECKS, WIRING ROUTING, INTERFACE CONNECTORS FOR BENT OR PUSH BACK CONTACTS ETC.</p> <p>SRMS SYSTEMS TESTING - STRONGBACK AND FLAT FLOOR AMBIENT PERFORMANCE TEST. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)</p>

PREPARED BY: RWG

SUPERCEDING DATE: 21 OCT 87

APPROV

DATE:

CRITICAL ITEMS LIST

PROJECT: RMS
ASS'Y NOMENCLATURE: D&C PANEL

SYSTEM: D&C SUBSYSTEM
ASS'Y P/N: 51140391

SHEET: 4

ITRA REF.	REV.	WAVE QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/IMP CRITICALITY	RATIONALE FOR ACCEPTANCE
41	1	MODE SELECT SWITCH QTY 1 P/N ME 452-0093-5106 ED 92020 SHEET 2	MODE: SWITCH CONTACT CONTINUOUSLY ON DIRECT DRIVE CAUSE(S): (1) SHORTED DIRECT DRIVE CONTACT ON 28V WIPER.	NO EFFECT FOR THIS FAILURE. NO EFFECT IN DIRECT UNLESS RMS IN PARK WITH BRAKE SELECT ON AND SUBSEQUENT FAILURES TO SINGLE/DIRECT SWITCH CAUSING UNCOMMANDED MOTION. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED CREW ACTION REQUIRED. REBUNDANT PATHS REMAINING SINGLE BACKUP, AUTO AND MANUAL		FAILURE HISTORY ----- THE FOLLOWING FAILURE ANALYSIS REPORT(S) ARE RELEVANT: FAR 4010: S/M 004 FEB 80 DESCRIPTION ----- DETENT FAILURE TO INADEQUATE WELDING CORRECTIVE ACTION ----- REPAIRED, TRAINED OPERATORS

PREPARED BY: WMC

SUPERSEDING DATE: 21 OCT 87

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: DIC PANCE

SYSTEM: DIC SUBSYSTEM
ASS'Y P/N: 51140E391

SHEET: 5

PREA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDNR / FUNC. 2/1RB CRITICALITY	RATIONALE FOR ACCEPTANCE
41	1	MODE SELECT SWITCH QTY 1 P/N WE 452-0093-5104 ED 92020 SHEET 2	MODE: SWITCH CONTACT CONTINUOUSLY ON DIRECT DRIVE CAUSE(S): (1) SHORTED DIRECT DRIVE CONTACT ON 28V WIPER.	NO EFFECT FOR THIS FAILURE. NO EFFECT IN DIRECT UNLESS RNS IN PARK WITH BRAKE SELECT ON AND SUBSEQUENT FAILURES TO SINGLE/DIRECT SWITCH CAUSING UNCOMMANDED MOTION. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING SINGLE, BACKUP, AUTO AWA MANUAL		OPERATIONAL EFFECTS ----- NONE WITH THIS FAILURE. NO EFFECT IS DIRECT UNLESS RNS IN PARK WITH BRAKE SELECT ON AND SUBSEQUENT FAILURES TO SINGLE/DIRECT SWITCH CAUSING UNCOMMANDED MOTION. ALL MODES OPERATIONAL. FOR SUBSEQUENT FAILURES SINGLE AND BACKUP AVAILABLE. AUTOBRAKES WILL STOP RNS MOTION FOR SUBSEQUENT FAILURE. CREW ACTION ----- NONE. CREW TRAINING ----- NONE. MISSION CONSTRAINTS ----- NONE. SCREEN FAILURES ----- B: NO ORBITER ANNUNCIATION ON DISPLAY. OMRSD OFFLINE ----- OPERATE ROTARY MODE SELECT SWITCH IN ALL POSITIONS. VERIFY CORRECT BITS IN DATA BUS. OMRSD ONLINE INSTALLATION ----- NONE. OMRSD ONLINE TURNAROUND ----- NONE.

PREPARED BY: RMG

SUPERSEDING DATE: 21 OCT 87

APPROV

DATE: _____