

CRITICAL ITEMS LIST

PROJECT: SMS
ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 517801174-38-5

SHEET: 1

P/N REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOWA / FUNC. 2/IR CRITICALITY	RATIONALE FOR ACCEPTANCE
3210	2	COMMAND LOGIC QTY-1 REFERENCE SCHEMATIC 2563765	<p>MODE: LOSS OF RELEASE.</p> <p>CAUSE(S): (1) U1 FAILS H. (2) U8C FAILS H. (3) U7A FAILS L.</p>	<p>WHEN RELEASE COMMANDED EEEU PRODUCES A CAPTURE COMMAND.</p> <p>CAUSE (1) DURING RELEASE SEQ. MOTOR WILL REVERSE DIRECTION. IF CAPTURED AND AT ZERO TENSION POINT MOTOR WILL STALL OR SLIP CLUTCH WITH RELEASE CMD.</p> <p>CAUSE (2) AND (3) WHEN RELEASE COMMANDED EEEU WILL NOT ENABLE MOTOR OR CLUTCH/BRAKE.</p> <p>WORST CASE ----- LOSS OF MISSION. LOSS OF EE PRIMARY MODES. CREW ACTION REQ.</p> <p>REDUNDANT PATHS REMAINING ----- BACKUP RELEASE</p>	<p>DESIGN FEATURES -----</p> <p>COMPARATORS AND OPERATIONAL AMPLIFIERS ARE STANDARD LINEAR INTEGRATED CIRCUITS WITH MATURE MANUFACTURING TECHNOLOGY. APPLICATION CONSTRAINTS ARE IN ACCORDANCE WITH SPAR-RMS-PA.041.</p> <p>THE DESIGN UTILIZES PROVEN CIRCUIT TECHNIQUES AND IS IMPLEMENTED USING CMOS LOGIC DEVICES.</p> <p>CMOS DEVICES OPERATE AT LOW POWER AND HENCE DO NOT EXPERIENCE SIGNIFICANT OPERATING STRESSES. THE TECHNOLOGY IS MATURE, AND DEVICE RELIABILITY HISTORY IS WELL DOCUMENTED. ALL STRESSES ARE ADDITIONALLY REDUCED BY DERATING THE APPROPRIATE PARAMETERS IN ACCORDANCE WITH SPAR-RMS-PA.003. SPECIAL HANDLING PRECAUTIONS ARE USED AT ALL STAGES OF MANUFACTURE TO PRECLUDE DAMAGE/STRESS DUE TO ELECTROSTATIC DISCHARGE.</p> <p>ALL RESISTORS AND CAPACITORS USED IN THE DESIGN ARE SELECTED FROM ESTABLISHED RELIABILITY (ER) TYPES. LIFE EXPECTANCY IS INCREASED BY ENSURING THAT ALL ALLOWABLE STRESS LEVELS ARE DERATED IN ACCORDANCE WITH SPAR-RMS-PA.003. ALL CERAMIC AND ELECTROLYTIC CAPACITORS ARE ROUTINELY SUBJECTED TO RADIOGRAPHIC INSPECTION.</p> <p>ALL EEEU LOGIC FUNCTIONS ARE CONTAINED ON ONE BOARD WHERE CIRCUIT PATHS ARE MINIMIZED.</p>	

RMS/ELEC - 919

PREPARED BY: HWS

SUPERSEDING DATE: 06 OCT 87

APPROVED BY:

IC: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 51140PT174-38-5

SHEET: 2

P/N & REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3230	2	COMMAND LOGIC QTY-1 REFERENCE SCHEMATIC 2563765	<p>MODE: LOSS OF RELEASE.</p> <p>CAUSE(S): (1) U1 FAILS H. (2) UBC FAILS H. (3) U7A FAILS L.</p>	<p>WHEN RELEASE COMMANDED EEEU PRODUCES A CAPTURE COMMAND.</p> <p>CAUSE (1) DURING RELEASE SEQ. MOTOR WILL REVERSE DIRECTION. IF CAPTURED AND AT ZERO TENSION POINT MOTOR WILL STALL OR SLIP CLUTCH WITH RELEASE CMD.</p> <p>CAUSE (2) AND (3) WHEN RELEASE COMMANDED EEEU WILL NOT ENABLE MOTOR OR CLUTCH/BRAKE.</p> <p>WORST CASE LOSS OF MISSION. LOSS OF EE PRIMARY MODES. CREW ACTION REQ.</p> <p>REDUNDANT PATHS REMAINING</p> <p>BACKUP RELEASE</p>		<p>ACCEPTANCE TESTS</p> <p>THE EEEU IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTING AS AN SRU.</p> <p>O VIBRATION: LEVEL AND DURATION REFERENCE TABLE 6</p> <p>O THERMAL: +70 DEGREES C TO -25 DEGREES C (1 1/2 CYCLES)</p> <p>THE EEEU IS INTEGRATED INTO THE END EFFECTOR AND IS FURTHER EXPOSED TO THE END EFFECTOR ACCEPTANCE TEST ENVIRONMENTS (VIBRATION AND THERMAL VACUUM).</p> <p>THE END EFFECTOR ASSEMBLY IS PART OF THE INTEGRATED RMS SYSTEM TESTS (1P518 RMS STRONGBACK TEST AND 1P552 FLAT FLOOR TEST) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE.</p> <p>QUALIFICATION TESTS</p> <p>THE EEEU IS SUBJECTED TO THE FOLLOWING SRU QUALIFICATION TEST ENVIRONMENTS.</p> <p>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 6</p> <p>O SHOCK: 70G/11MS - 3 AXES (6 DIRECTIONS)</p> <p>O THERMAL: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1 X 10⁻⁶ TORR</p> <p>O HUMIDITY: TESTED IN THE END EFFECTOR HUMIDITY TEST.</p> <p>O EMC: MIL-STD 461 AS MODIFIED BY SL-E-0002 (TESTS CE01, CE03, CS01, CS02, CS06, RE01, RE02 (H/B) RS01).</p> <p>FLIGHT CHECKOUT</p> <p>PORS OPS CHECKLIST (ALL VEHICLES) JSC 16907</p>

RMS/ELEC - 920

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EECU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 5110FT174-3A-5

SHEET: 1

P/N & REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3230	2	COMMAND LOGIC QTY-1 REFERENCE SCHEMATIC 2563765	<p>MODE: LOSS OF RELEASE.</p> <p>CAUSE(S): (1) U1 FAILS H. (2) UBC FAILS H. (3) U7A FAILS L.</p>	<p>WHEN RELEASE COMMANDED EECU PRODUCES A CAPTURE COMMAND.</p> <p>CAUSE (1) DURING RELEASE SEQ. MOTOR WILL REVERSE DIRECTION. IF CAPTURED AND AT ZERO TENSION POINT MOTOR WILL STALL OR SLIP CLUTCH WITH RELEASE CMD.</p> <p>CAUSE (2) AND (3) WHEN RELEASE COMMANDED EECU WILL NOT ENABLE MOTOR OR CLUTCH/BRAKE.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. LOSS OF EE PRIMARY MODES. CREW ACTION REQ.</p> <p>REDUNDANT PATHS REMAINING</p> <p>BACKUP RELEASE</p>	QA/INSPECTIONS	<p>UNITS ARE MANUFACTURED UNDER DOCUMENTED QUALITY CONTROLS. THESE CONTROLS ARE EXERCISED THROUGHOUT DESIGN, PROCUREMENT, PLANNING, RECEIVING, PROCESSING, FABRICATION, ASSEMBLY, TESTING AND SHIPPING OF THE UNITS. MANDATORY INSPECTION POINTS ARE EMPLOYED AT VARIOUS STAGES OF FABRICATION ASSEMBLY AND TEST. GOVERNMENT SOURCE INSPECTION IS INVOKED AT VARIOUS CONTROL LEVELS.</p> <p>EEE PARTS INSPECTION IS PERFORMED AS REQUIRED BY SPAR RMS-PA.003. EACH EEE PART IS QUALIFIED AT THE PART LEVEL TO THE REQUIREMENTS OF THE APPLICABLE SPECIFICATION. ALL EEE PARTS ARE 100% SCREENED AND BURNED IN, AS A MINIMUM AS REQUIRED BY SPAR-RMS-PA.003, BY THE SUPPLIER. ADDITIONALLY, EEE PARTS ARE 100% RE SCREENED IN ACCORDANCE WITH REQUIREMENTS, BY AN INDEPENDENT SPAR APPROVED TESTING FACILITY. OPA IS PERFORMED AS REQUIRED BY PA.003 ON A RANDOMLY SELECTED SR OF PARTS, MAXIMUM 5 PIECES, MINIMUM 3 PIECES FOR EACH LOT NUMBER/DATE CODE OF PARTS RECEIVED.</p> <p>WIRE IS PROCURED TO SPECIFICATION MIL-W-22759 OR MIL-W-81101 AND INSPECTED AND TESTED TO NASA JSCN8080 STANDARD NUMBER 95A.</p> <p>RECEIVING INSPECTION VERIFIES THAT ALL PARTS RECEIVED ARE AS IDENTIFIED IN THE PROCUREMENT DOCUMENTS, THAT NO PHYSICAL DAMAGE HAS OCCURRED TO PARTS DURING SHIPMENT, THAT THE RECEIVING DOCUMENTS PROVIDE ADEQUATE TRACEABILITY INFORMATION AND SCREENING DATA CLEARLY IDENTIFIES ACCEPTABLE PARTS.</p> <p>PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE:</p> <p>PRINTED CIRCUIT BOARD INSPECTION FOR TRACK SEPARATION, DAMAGE AND ADEQUACY OF PLATED THROUGH HOLES.</p> <p>COMPONENT MOUNTING INSPECTION FOR CORRECT SOLDERING, WIRE LOOPING, STRAPPING, ETC. OPERATORS AND INSPECTORS ARE TRAINED AND CERTIFIED TO NASA HNB 5300.4(3-1) STANDARD.</p> <p>CONFORMAL COATING INSPECTION FOR ADEQUATE PROCESSING IS PERFORMED USING ULTRAVIOLET LIGHT TECHNIQUES.</p> <p>POST P.C. BD. INSTALLATION INSPECTION, CLEANLINESS AND WORKMANSHIP (SPAR/GOVERNMENT REP. MANDATORY INSPECTION POINT)</p> <p>P.C. BD. INSTALLATION INSPECTION, CHECK FOR CORRECT BOARD INSTALLATION, ALIGNMENT OF BOARDS, PROPER CONNECTOR CONTACT MATING, WIRE ROUTING, STRAPPING OF WIRES ETC.,</p> <p>PRE-CLOSURE INSPECTION, WORKMANSHIP AND CLEANLINESS (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)</p> <p>PRE-ACCEPTANCE TEST INSPECTION, WHICH INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC., (MANDATORY INSPECTION POINT).</p>

RMS/ELEC - 921

PREPARED BY: MWG

SUPERSEDING DATE: 06 OCT 87

APPROVED BY:

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 51740PT174-3B-5

SHEET: 4

THEA REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FUNC. 2/1A CRITICALITY	RATIONALE FOR ACCEPTANCE
3230	2	COMMAND LOGIC QTY-1 REFERENCE SCHEMATIC 2563765	MODE: LOSS OF RELEASE. CAUSE(S): (1) UT FAILS N. (2) UBC FAILS H. (3) U7A FAILS L.	WHEN RELEASE COMMANDED EEU PRODUCES A CAPTURE COMMAND. CAUSE (1) DURING RELEASE SEQ. MOTOR WILL REVERSE DIRECTION. IF CAPTURED AND AT ZERO TENSION POINT MOTOR WILL STALL OR SLIP CLUTCH WITH RELEASE CMD. CAUSE (2) AND (3) WHEN RELEASE COMMANDED EEU WILL NOT ENABLE MOTOR OR CLUTCH/BRAKE. WORST CASE ----- LOSS OF MISSION. LOSS OF EE PRIMARY MODES. CREW ACTION REQ. REUNDANT PATHS REMAINING ----- BACKUP RELEASE		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). ACCEPTANCE TESTING (ATP) INCLUDES AMBIENT PERFORMANCE, THERMAL AND VIBRATION TESTING. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT). INTEGRATION OF UNIT TO END EFFECTOR ASSY - INSPECTIONS INCLUDE GROUNDING CHECKS, CONNECTERS FOR BENT OF PUSHBACK CONTACTS, VISUAL, CLEANLINESS, INTERCONNECT WIRING ETC. AND POWER-UP TEST TO SPAR INSPECTION TEST PROCEDURE ITP-2510. PRE-ACCEPTANCE TEST INSPECTION, WHICH INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC. (MANDATORY INSPECTION POINT). ACCEPTANCE TESTING (ATP) INCLUDES AMBIENT, VIBRATION AND THERMAL-VAC TESTING. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT) SRMS SYSTEMS INTEGRATION, THE INTEGRATION OF MECHANICAL ARM 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. SRMS SYSTEMS TESTING - STRONGBACK AND FLAT FLOOR AMBIENT PERFORMANCE TEST. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)

RMS/ELEC - 922

PREPARED BY: MEM

SUPERSEDING DATE: 06 OCT 87

APPROVED BY: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 51140F1174-3E-5

SHEET: 5

P/N REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWA / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3230	2	COMMAND LOGIC QTY-1 REFERENCE SCHEMATIC 2561765	MODE: LOSS OF RELEASE. CAUSE(S): (1) U1 FAILS H. (2) U0C FAILS H. (3) U7A FAILS L.	WHEN RELEASE COMMANDED EEEU PRODUCES A CAPTURE COMMAND. CAUSE (1) DURING RELEASE SEQ. MOTOR WILL REVERSE DIRECTION. IF CAPTURED AND AT ZERO TENSION POINT MOTOR WILL STALL OR SLIP CLUTCH WITH RELEASE CMD. CAUSE (2) AND (3) WHEN RELEASE COMMANDED EEEU WILL NOT ENABLE MOTOR OR CLUTCH/BRAKE. WORST CASE ----- LOSS OF MISSION. LOSS OF EE PRIMARY MODES. CREW ACTION REQ. REDUNDANT PATHS REMAINING ----- BACKUP RELEASE	FAILURE HISTORY ----- THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.	

RMS/ELEC - 923

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 51140PT174-10-5

SHEET: 6

P/N & REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FUNC. 2/IN CRITICALITY	RATIONALE FOR ACCEPTANCE
3230	2	COMMAND LOGIC QTY-1 REFERENCE SCHEMATIC 2563765	<p>MODE: LOSS OF RELEASE.</p> <p>CAUSE(S): (1) U1 FAILS H. (2) UBC FAILS H. (3) U7A FAILS L.</p>	<p>WHEN RELEASE COMMANDED EEUU PRODUCES A CAPTURE COMMAND.</p> <p>CAUSE (1) DURING RELEASE SEQ. MOTOR WILL REVERSE DIRECTION. IF CAPTURED AND AT ZERO TENSION POINT MOTOR WILL STALL ON SLIP CLUTCH WITH RELEASE CMD.</p> <p>CAUSE (2) AND (3) WHEN RELEASE COMMANDED EEUU WILL NOT ENABLE MOTOR OR CLUTCH/BRAKE.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. LOSS OF EE PRIMARY MODES. CREW ACTION REQ.</p> <p>REDUNDANT PATHS REMAINING</p> <p>BACKUP RELEASE</p>		<p>OPERATIONAL EFFECTS</p> <p>-----</p> <p>THE PAYLOAD CANNOT BE RELEASED IN A PRIMARY EE MODE. WITH A SUBSEQUENT FAILURE, THE BACKUP STANDBY SYSTEM WILL NOT PROVIDE THE CAPABILITY TO RELEASE THE PAYLOAD. PAYLOAD MAY BE RELEASED WITH EVA OR ARM AND PAYLOAD MUST BE JETTISONED.</p> <p>CREW ACTION</p> <p>-----</p> <p>USE BACKUP TO RELEASE THE PAYLOAD. IF BACKUP IS FAILED, PERFORM AN EVA TO RELEASE THE PAYLOAD OR JETTISON.</p> <p>CREW TRAINING</p> <p>-----</p> <p>CREW WILL BE TRAINED TO DETECT ANY OFF NOMINAL EE OPERATIONS.</p> <p>MISSION CONSTRAINTS</p> <p>-----</p> <p>NONE.</p> <p>SCREEN FAILURES</p> <p>-----</p> <p>N/A</p> <p>OMRSD OFFLINE</p> <p>-----</p> <p>PERFORM MANUAL EE RELEASE VERIFY CORRECT TIME FOR OPEN FLAG TO CHANGE STATE.</p> <p>OMRSD ONLINE INSTALLATION</p> <p>-----</p> <p>NONE</p> <p>OMRSD ONLINE TURNAROUND</p> <p>-----</p> <p>PERFORM MANUAL EE RELEASE. VERIFY CORRECT TIME FOR OPEN FLAG TO CHANGE TO GREY.</p>

RMS/ELEC - 924

PREPARED BY: HWG

SUPERCEDING DATE: 06 OCT 07

APPROVED BY:

TC: _____