

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: EEEE

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 5114DF1174-38-5

SHEET: 1

ITEM REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FREQ. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3300	4	BITE CIRCUITRY SCHEMATIC 2563765	MODE: EEEU BITE CIRCUIT FAILS LOW. CAUSE(S): (1) U200 FAILS HIGH.	FALSE BITE INDICATION OCCURS. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION. REDUNDANT PATHS REMAINING ----- INCOMPLETE RIGIDIZATION FAILURE		DESIGN FEATURES ----- THE DESIGN UTILIZES PROVEN CIRCUIT TECHNIQUES AND IS IMPLEMENTED USING CMOS LOGIC DEVICES. 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.

RMS/ELEC - 1039

PREPARED BY: HWG

SUPERSEDING DATE: 12 OCT 89

APPROVED BY

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51140FT174-38-5

SHEET: 2

ITEM REF.	REV.	MODE DTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	MODE / FUNC. 2/1R CRITICALITY RATIONALE FOR ACCEPTANCE
3300	4	BITE CIRCUITRY SCHEMATIC 2563765	MODE: EEEU BITE CIRCUIT FAILS LOW. CAUSE(S): (1) U200 FAILS HIGH.	FALSE BITE INDICATION OCCURS. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION. REDUNDANT PATHS REMAINING INCOMPLETE RIGIDIZATION FAILURE	ACCEPTANCE TESTS THE EEEU IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTING AS AN SRU. O VIBRATION: LEVEL AND DURATION REFERENCE TABLE 6 O THERMAL: +70 DEGREES C TO -25 DEGREES C (1 1/2 CYCLES) THE EEEU IS INTEGRATED INTO THE END EFFECTOR AND IS FURTHER EXPOSED TO THE END EFFECTOR ACCEPTANCE TEST ENVIRONMENTS (VIBRATION AND THERMAL VACUUM). THE END EFFECTOR ASSEMBLY IS PART OF THE INTEGRATED RMS SYSTEM TESTS (1P510 RMS STRONGBACK TEST AND 1P552 FLAT FLOOR TEST) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE. QUALIFICATION TESTS THE EEEU IS SUBJECTED TO THE FOLLOWING SRU QUALIFICATION TEST ENVIRONMENTS. O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 6 O SHOCK: 20G/11MS - 3 AXES (6 DIRECTIONS) O THERMAL: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1 H 10 ⁻⁶ -6 TORR O HUMIDITY: TESTED IN THE END EFFECTOR HUMIDITY TEST. O EMC: MIL-STD-461 AS MODIFIED BY SL-E-0002 (TESTS CE01, CE03, CS01, CS02, CS06, RE01, RE02 (N/B) RS01). FLIGHT CHECKOUT PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987

RMS/ELEC - 1040

PREPARED BY: MEMG SUPERSEDING DATE: 12 OCT 89 APPROVED BY: _____

DATE: _____

CRITICAL ITEMS LIST

PROJECT: RMS
ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 511401174-38-5

SHEET: 3

ITEM REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RISK / FORC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3300	4	BITE CIRCUITRY SCHEMATIC 2563765	<p>MODE: EEEE BITE CIRCUIT FAILS LOW.</p> <p>CAUSE(S): (1) U200 FAILS HIGH.</p>	<p>FALSE BITE INDICATION OCCURS.</p> <p>WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION.</p> <p>REDUNDANT PATHS REMAINING ----- INCOMPLETE RIGIDIZATION FAILURE</p>	<p>QA/INSPECTIONS -----</p>	<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. DPA IS PERFORMED AS REQUIRED BY PA.003 ON A RANDOMLY SELECTED 5% 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-81301 AND INSPECTED AND TESTED TO NASA JSCM0000 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 WHB 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 - 1041

PREPARED BY: MEM

SUPERSEDING DATE: 12 OCT 69

APPROVED BY

DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 511601174-38-5

SHEET: 4

ITEM REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / YUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3300	4	BITE CIRCUITRY SCHEMATIC 2563765	<p>MODE: EEEE BITE CIRCUIT FAILS LOW.</p> <p>CAUSE(S): (1) U200 FAILS HIGH.</p>	<p>FALSE BITE INDICATION OCCURS.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION.</p> <p>REDUNDANT PATHS REMAINING</p> <p>INCOMPLETE RIGIDIZATION FAILURE</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 UNIT TO END EFFECTOR ASSY - INSPECTIONS INCLUDE GROUNDING CHECKS, CONNECTORS FOR BENT OF PUSHBACK CONTACTS, VISUAL, CLEANLINESS INTERCONNECT WIRING ETC. AND POWER-UP TEST TO SPAR INSPECTION TEST PROCEDURE ITP-251D.</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> <p>ACCEPTANCE TESTING (ATP) INCLUDES AMBIENT, VIBRATION AND THERMAL-VAC TESTING, (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)</p> <p>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.</p> <p>SRMS SYSTEMS TESTING - STRONGBACK AND FLAT FLOOR AMBIENT PERFORMANCE TEST. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)</p>

RMS/ELEC - 1042

PREPARED BY: MFV

SUPERCEDING DATE: 12 OCT 89

APPROVED

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 511401174-3B-5

SHEET: 5

YMR REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	DOWN / TUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3300	4	BITE CIRCUITRY SCHEMATIC 2563765	MODE: EEEU BITE CIRCUIT FAILS LOW. CAUSE(S): (1) U280 FAILS HIGH.	FALSE BITE INDICATION OCCURS. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION. REDUNDANT PATHS REMAINING ----- INCOMPLETE RIGIDIZATION FAILURE		FAILURE HISTORY ----- THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

RMS/ELEC - 1043

PREPARED BY: HEWG

SUPERSEDING DATE: 12 OCT 89

APPROVED BY

DATE: _____

CRITICAL ITEM LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEUU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: ST1407174-3E-5

SHEET: 6

P/N & REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	MODE / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3300	4	BITE CIRCUITRY SCHEMATIC 2563765	<p>MODE: EEUU BITE CIRCUIT FAILS LOW.</p> <p>CAUSE(S): (1) U200 FAILS HIGH.</p>	<p>FALSE BITE INDICATION OCCURS.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION.</p> <p>REDUNDANT PATHS REMAINING</p> <p>INCOMPLETE RIGIDIZATION FAILURE</p>		<p>OPERATIONAL EFFECTS</p> <p>-----</p> <p>NONE: UNABLE TO RIGIDIZE/DERIGIDIZE WITH SUBSEQUENT FAILURE. IF FAILURE OCCURS DURING RIGIDIZE SEQUENCE, THE CARRIAGE WILL NOT COMPLETELY RIGIDIZE AND ARM WILL REMAIN LIMP IF IN AUTO MODE. OPERATOR WILL DETECT OFF NOMINAL OPERATION OF THE EE.</p> <p>CREW ACTION</p> <p>-----</p> <p>NONE. WITH SUBSEQUENT FAILURE THE EE MODE SWITCH SHOULD BE TURNED OFF. CREW SHOULD OBSERVE THE CAPTURE 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, ATTEMPT TO RIGIDIZE IN THE ALTERNATE MODE. IF RIGIDIZE IS UNSUCCESSFUL, ATTEMPT RELEASE USING PRIMARY EE MODE. IF SHARES OPEN, MANEUVER THE ARM AWAY FROM THE PAYLOAD. IF SHARES DON'T OPEN, ATTEMPT TO RELEASE IN BACKUP MODE. IF SHARES OPEN, MANEUVER ARM AWAY FROM PAYLOAD. MANEUVER ORBITER AWAY FROM PAYLOAD. IF SHARES CANNOT BE OPENED IN ANY MODE, THEN THE ARM/PAYLOAD COMBINATION CAN BE JETTISONED.</p> <p>CREW TRAINING</p> <p>-----</p> <p>CREW TO BE TRAINED TO RECOGNIZE OFF NOMINAL OPERATION OF THE EE AND AND TURN MODE SWITCH TO OFF AFTER SPEC TIME AND MANEUVER THE ORBITER AWAY FROM A FREE FLYING PAYLOAD AT ANY TIME DURING ARM OPERATIONS.</p> <p>MISSION CONSTRAINT</p> <p>-----</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> <p>SCREEN FAILURES</p> <p>-----</p> <p>N/A</p> <p>CMRSD OFFLINE</p> <p>-----</p> <p>ON EEUU VERIFY THAT EEUU BITE IS NOT INDICATED</p> <p>CMRSD ONLINE INSTALLATION</p> <p>-----</p> <p>NONE</p> <p>CMRSD ONLINE TURNAROUND</p> <p>-----</p> <p>VERIFY ABE DATA AND ABE FAILURE WARNING THAT EEUU BITE IS NOT</p>

RMS/ELEC - 1044

PREPARED BY: HWG

SUPERSEDING DATE: 12 OCT 89

APPROVED BY: _____

DATE: _____

CRITICAL ITEM LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 511401174-38-5

SHEET: 7

P/N REF.	REV.	MODE, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	MODE / QTY, 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE
3300	4	BITE CIRCUITRY SCHEMATIC 2563765	MODE: EEEU BITE CIRCUIT FAILS LOW. CAUSE(S): (1) U200 FAILS HIGH.	FALSE BITE INDICATION OCCURS. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION. REDUNDANT PATHS REMAINING INCOMPLETE RIGIDIZATION FAILURE	SET	

RMS/ELEC - 1045

PREPARED BY: HWG

SUPERCEDING DATE: 12 OCT 69

APPROVED BY:

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