

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51140F1174-5 SHEET: 1

P/N REF.	REV.	NAME, QTY. & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/1RB CRITICALITY	RATIONALE FOR ACCEPTANCE
3372	0	BITE CIRCUITRY SCHEMATIC 2563765	MODE: EEEU BITE CIRCUIT FAILS HIGH. CAUSE(S): (1) U26A FAILS HIGH.	NONE. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION FAILURE. REDUNDANT PATHS REMAINING ----- INCOMPLETE RIGIDIZATION FAILURE.		<p>DESIGN FEATURES</p> <p>-----</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.001. SPECIAL HANDLING PRECAUTIONS ARE USED AT ALL STAGES OF MANUFACTURE TO PRECLUDE DAMAGE/STRESS DUE TO ELECTROSTATIC DISCHARGE.</p>

RMS/ELEC - 1031

PREPARED BY: RMS SUPERSEDING DATE: 06 OCT 87 APPROVED BY:

ATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EECU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/R: 517407174-5

SHEET: 2

RMS/ELEC - 1032

THCA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FUNC. 2/1RD CRITICALITY	RATIONALE FOR ACCEPTANCE
3372	0	BITE CIRCUITRY SCHEMATIC 2563765	<p>MODE: EECU BITE CIRCUIT FAILS HIGH.</p> <p>CAUSE(S): (1) U26A FAILS HIGH.</p>	<p>NONE.</p> <p>WORST CASE</p> <p>LOSS OF MISSION, SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION FAILURE.</p> <p>REDUNDANT PATHS REMAINING</p> <p>INCOMPLETE RIGIDIZATION FAILURE.</p>		<p>ACCEPTANCE TESTS</p> <p>THE EECU IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTING AS AN SRU.</p> <ul style="list-style-type: none"> O VIBRATION: LEVEL AND DURATION REFERENCE TABLE 6 O THERMAL: +70 DEGREES C TO -25 DEGREES C (1 1/2 CYCLES) <p>THE EECU 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 (IP510 RMS STRONGBACK TEST AND IP552 FLAT FLOOR TEST) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE.</p> <p>QUALIFICATION TESTS</p> <p>THE EECU IS SUBJECTED TO THE FOLLOWING SRU QUALIFICATION TEST ENVIRONMENTS.</p> <ul style="list-style-type: none"> O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 6 O SHOCK: 20G/PIMS - 3 AXES (6 DIRECTIONS) O THERMAL: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1 X 10⁻⁶ TORR O HUMIDITY: TESTED IN THE END EFFECTOR HUMIDITY TEST. O ENC: MIL-STD-461 AS MODIFIED BY SL-E-0002 (TESTS CC01, CC03, CS01, CS02, CS06, RE01, RE02 (N/B) RS01). <p>FLIGHT CHECKOUT</p> <p>PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16907</p>

PREPARED BY: FWG

SUPERCEDING DATE: 04 OCT 87

APPROVED BY: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 511401171-5

SHEET: 3

P/N REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HOUR / FUNC. Z/100 CRITICALITY	RATIONALE FOR ACCEPTANCE
3372	0	DTE CIRCUITRY SCHEMATIC 2563765	<p>MODE: EEEE DTE CIRCUIT FAILS HIGH.</p> <p>CAUSE(S): (1) U26A FAILS HIGH.</p>	<p>NONE.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION FAILURE.</p> <p>REUNDANT PATHS REMAINING</p> <p>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 81701 AND INSPECTED AND TESTED TO NASA JSCN000 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 - 1038

PREPARED BY: RMG

SUPERSEDING DATE: 06 OCT 87

APPROVED BY: _____

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 511461174-5

SHEET: 4

FPCA REF.	REV.	PART QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HDMR / FUNC. 2/IRB CRITICALITY	RATIONALE FOR ACCEPTANCE
3372	0	BITE CIRCUITRY SCHEMATIC 2563765	<p>MODE: EEU BITE CIRCUIT FAILS HIGH.</p> <p>CAUSE(S): (1) U26A FAILS HIGH.</p>	<p>NONE.</p> <p>-----</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION FAILURE.</p> <p>-----</p> <p>REDUNDANT PATHS REMAINING</p> <p>-----</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-2510.</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 - 1034

CRITICAL ITEMS LIST

PROJECT: SMS
ASS'Y NOMENCLATURE: EEEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 511001174-5

SHEET: 5

ITEM REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FUNC. 2/IRB CRITICALITY	RATIONALE FOR ACCEPTANCE
3372	0	BITE CIRCUITRY SCHEMATIC 2563765	MODE: EEEU BITE CIRCUIT FAILS HIGH. CAUSE(S): (1) U26A FAILS HIGH.	NONE. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION FAILURE. REDUANT PATHS REMAINING INCOMPLETE RIGIDIZATION FAILURE.	FAILURE HISTORY	THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SMS PROGRAM.

RMS/ELEC - 1035

PREPARED BY: DEMG SUPERCEDING DATE: 06 OCT 97 APPROVED BY: _____

CRITICAL ITEMS LIST

PROJECT: SMS
ASS'Y NOMENCLATURE: EEU

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 5110F1174-5

SHEET: 6

PMA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HWM / FUNC. 2/1RB CRITICALITY	RATIONALE FOR ACCEPTANCE
3372	0	BITE CIRCUITRY SCHEMATIC 2563765	<p>MODE: EEEU BITE CIRCUIT FAILS HIGH.</p> <p>CAUSE(S): (1) U76A FAILS HIGH.</p>	<p>NONE.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RIGIDIZATION FAILURE.</p> <p>REDUNDANT PATHS REMAINING</p> <p>INCOMPLETE RIGIDIZATION FAILURE.</p>		<p>OPERATIONAL EFFECTS</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>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 SNARES OPEN, MANEUVER THE ARM AWAY FROM THE PAYLOAD. IF SNARES DON'T OPEN, ATTEMPT TO RELEASE IN BACKUP MODE. IF SNARES OPEN, MANEUVER ARM AWAY FROM PAYLOAD. MANEUVER ORBITER AWAY FROM PAYLOAD. IF SNARES CANNOT BE OPENED IN ANY MODE, THEN THE ARM/PAYLOAD COMBIN ATION CAN BE JETTISONED.</p> <p>CREW TRAINING</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>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>0: EE OPERATES NORMALLY. INDEPENDENT PATH NOT INSTRUMENTED.</p> <p>OHRSO OFFLINE</p> <p>ACTIVATE EE BITE TEST POINT. VERIFY EEU BITE INDICATION.</p> <p>OHRSO ONLINE INSTALLATION</p>

RMS/ELEC - 1036

PREPARED BY: HMC

SUPERCEDING DATE: 06 OCT 87

APPROVED BY:

CRITICAL ITEMS LIST

PROJECT: SAMS
 ASS'Y NOMENCLATURE: ECEU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 511407174-5

SHEET: 1

P/N REF.	REV.	NAME OF DRAWING OR DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HBM / FUNC. 2/IRB CRITICALITY	RATIONALE FOR ACCEPTANCE
3332	0	BITE CIRCUITRY SCHEMATIC 2561765	MODE: ECEU BITE CIRCUIT FAILS HIGH. CAUSE(S): U76A FAILS HIGH.	NONE. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY RESULT IN INCOMPLETE RECONFIGURATION FAILURE. REUNDANT PATHS REMAINING ----- INCOMPLETE RECONFIGURATION FAILURE.	NONE	OMRSD ONLINE TURNDOWN ----- ACTIVATE EE BITE TEST POINT. VERIFY ECEU BITE INDICATION.

RMS/ELEC - 1037

PREPARED BY: HWG SUPERSEDING DATE: 98 OCT 97 APPROVED BY

DATE: _____