CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU
SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 51T40F1174-3&5
SHEET: 1

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
3550	2	MOTOR DRIVE SCHEMATIC QTY-1 2263764 AND 2563765	MODE: LOSS OF 28V SUPPLY VOLTAGE. CAUSE(S): (1) SHORT CIRCUIT IN ANY OF THE FOLLOWING C1, C2, R23, L1, D2, D1. (2) SPEE RELAY S/C TO CASE	NO OUTPUT TO END EFFECTOR MOTOR AND TO EE BRAKES AND CLUTCHES. SYSTEM WILL BE INOPERATIVE IN ALL PRIME MODES. EE FUSES WILL BLOW AT SHOULDER LOSE SPEE POWER. ARM WILL LIMP DURING CAPTURE SEQ. WORST CASE ---------- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING ---------- BACKUP EE RELEASE.	DESIGN FEATURES ---------- DISCRETE SEMICONDUCTOR DEVICES SPECIFIED TO AT LEAST THE TX LEVEL OF MIL-S-19500. ALL DEVICES ARE SUBJECTED TO RE-SCREENING BY AN INDEPENDANT TEST HOUSE. SAMPLES OF ALL PROCURED LOTS/DATE CODES ARE SUBJECTED TO DESTRUCTIVE PHYSICAL ANALYSIS (DPA) TO VERIFY THE INTEGRITY OF THE MANUFACTURING PROCESSES. DEVICE STRESS LEVELS ARE, DERATED IN ACCORDANCE WITH SPAR-RMS-PA.003 AND VERIFIED BY DESIGN REVIEW. 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.

PREPARED BY: MFWG
SUPERCEDING DATE: 06 OCT 87
APPROVED BY:
DATE: 24 JUL 91
CIL REV: 2

RMS/ELEC - 1075

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU
SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 51140F1374-3&5
SHEET: 2

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
3550	2	MOTOR DRIVE SCHEMATIC QTY-1 2263764 AND 2563765	MODE: LOSS OF 28V SUPPLY VOLTAGE. CAUSE(S): (1) SHORT CIRCUIT IN ANY OF THE FOLLOWING C1, C2, R23, L1, D2, D1. (2) SPEE RELAY S/C TO CASE	NO OUTPUT TO END EFFECTOR MOTOR AND TO EE BRAKES AND CLUTCHES. SYSTEM WILL BE INOPERATIVE IN ALL PRIME MODES. EE FUSES WILL BLOW AT SHOULDER LOSE SPEE POWER. ARM WILL LIMP DURING CAPTURE SEQ. WORST CASE --- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING --- BACKUP EE RELEASE.	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 (TP510 RMS STRONGBACK TEST AND TP552 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: +61 DEGREES C TO -36 DEGREES C (6 CYCLES) 1 X 10**-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

PREPARED BY: MFWG
SUPERCEDING DATE: 06 OCT 87
DATE: 24 JUL 91
CIL REV: 2

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: SERV
SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: S1T40F1174-38-5
SHEET: 3

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	MDWR / FUNC. 2/1R CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
3950	2	MOTOR DRIVE SCHEMATIC QTY-1 2263764 AND 2563765	MODE: LOSS OF 28V SUPPLY VOLTAGE. CAUSE(S): (1) SHORT CIRCUIT IN ANY OF THE FOLLOWING C1, C2, R23, L1, D2, D1. (2) SPEE RELAY S/C TO CASE	NO OUTPUT TO END EFFECTOR MOTOR AND TO EE BRAKES AND CLUTCHES. SYSTEM WILL BE INOPERATIVE IN ALL PRIME MODES. EE FUSES WILL BLOW AT SHOULDER LOSE SPEE POWER. ARM WILL LIMP DURING CAPTURE SEQ. WORST CASE --- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING --- BACKUP EE RELEASE.	QA/INSPECTIONS --- 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. 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. WIRE IS PROCURED TO SPECIFICATION MIL-W-22759 OR MIL-W-81381 AND INSPECTED AND TESTED TO NASA JSCN8080 STANDARD NUMBER 95A. 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. PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE, PRINTED CIRCUIT BOARD INSPECTION FOR TRACK SEPARATION, DAMAGE AND ADEQUACY OF PLATED THROUGH HOLES, COMPONENT MOUNTING INSPECTION FOR CORRECT SOLDERING, WIRE LOOPING, STRAPPING, ETC. OPERATORS AND INSPECTORS ARE TRAINED AND CERTIFIED TO NASA NHB 5300.4(3-1) STANDARD. CONFORMAL COATING INSPECTION FOR ADEQUATE PROCESSING IS PERFORMED USING ULTRAVIOLET LIGHT TECHNIQUES. POST P.C. BD. INSTALLATION INSPECTION, CLEANLINESS AND WORKMANSHIP (SPAR/GOVERNMENT REP. MANDATORY INSPECTION POINT) P.C. BD. INSTALLATION INSPECTION, CHECK FOR CORRECT BOARD INSTALLATION, ALIGNMENT OF BOARDS, PROPER CONNECTOR CONTACT MATING, WIRE ROUTING, STRAPPING OF WIRES ETC., PRE-CLOSURE INSPECTION, WORKMANSHIP AND CLEANLINESS (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT) PRE-ACCEPTANCE TEST INSPECTION, WHICH INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC., (MANDATORY INSPECTION POINT).

PREPARED BY: HFWG
SUPERCEDING DATE: 06 OCT 87
APPROVED BY:
DATE: 24 JUL 91
CIL REV: 2

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU
SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 5114UF1174-3&-5
SHEET: 4

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
3550	2	MOTOR DRIVE SCHEMATIC QTY-1 2263764 AND 2563765	MODE: LOSS OF 28V SUPPLY VOLTAGE. CAUSE(S): (1) SHORT CIRCUIT IN ANY OF THE FOLLOWING C1, C2, R23, L1, D2, D1. (2) SPEE RELAY S/C TO CASE	NO OUTPUT TO END EFFECTOR MOTOR AND TO EE BRAKES AND CLUTCHES. SYSTEM WILL BE INOPERATIVE IN ALL PRIME MODES. EE FUSES WILL BLOW AT SHOULDER LOSE SPEE POWER. ARM WILL LIMP DURING CAPTURE SEQ. WORST CASE ---------- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING ---------- BACKUP EE 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 GOVENMENT 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-251D. 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)

PREPARED BY: MFWG
SUPERCEDING DATE: 06 OCT 87
DATE: 24 JUL 91
CIL REV: 2

RMS/ELEC - 1078

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU
SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: ST140T1174-3E-5
SHEET: 5

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/1R CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
3550	2	MOTOR DRIVE SCHEMATIC QTY-1 2263764 AND 2563765	MODE: LOSS OF 28V SUPPLY VOLTAGE. CAUSE(S): (1) SHORT CIRCUIT IN ANY OF THE FOLLOWING C1, C2, R23, L1, D2, D1. (2) SPEE RELAY B/C TO CASE	NO OUTPUT TO END EFFECTOR MOTOR AND TO EE BRAKES AND CLUTCHES. SYSTEM WILL BE INOPERATIVE IN ALL PRIME MODES. EE FUSES WILL BLOW AT SHOULDER LOSE SPEE POWER. ARM WILL LIMP DURING CAPTURE SEQ. WORST CASE ---------- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING ---------- BACKUP EE RELEASE.	FAILURE HISTORY ---------- THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

PREPARED BY: MFWG
SUPERCEDING DATE: 06 OCT 87
APPROVED BY:
DATE: 24 JUL 91
CIL REV: 2

RMS/ELEC - 1079

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: EEEU
SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: S114OF1174-3&-5
SHEET: 6

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
3$50	2	MOTOR DRIVE SCHEMATIC QTY-1 2263764 AND 2563765	MODE: LOSS OF 28V SUPPLY VOLTAGE. CAUSE(S): (1) SHORT CIRCUIT IN ANY OF THE FOLLOWING C1, C2, R23, L1, D2, D1. (2) SPEE RELAY S/C TO CASE	NO OUTPUT TO END EFFECTOR MOTOR AND TO EE BRAKES AND CLUTCHES. SYSTEM WILL BE INOPERATIVE IN ALL PRIME MODES. EE FUSES WILL BLOW AT SHOULDER LOSE SPEE POWER. ARM WILL LIMP DURING CAPTURE SEQ. WORST CASE ---------- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING ---------- BACKUP EE RELEASE.	OPERATIONAL EFFECTS ---------- EE DOES NOT OPERATE NOMINALLY WHEN COMMANDED. ARM REMAINS LIMP UNTIL EE MODE SWITCH IS TURNED OFF DURING AN AUTO CAPTURE SEQUENCE. CREW ACTION ---------- FOR ANY OFF NOMINAL OPERATION OF THE EE, THE EE MODE SWITCH SHOULD BE TURNED OFF. ATTEMPT TO CAPTURE IN THE ALTERNATE MODE. IF THE SNARES REMAIN OPEN, MANEUVER ARM AWAY FROM PAYLOAD. IF THE SNARES ARE PARTIALLY CLOSED, ATTEMPT RELEASE USING A 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 THE PAYLOAD. MANEUVER ORBITER AWAY FROM PAYLOAD. IF SNARES CANNOT BE OPENED, IN ANY MODE, EVA CAN BE USED TO RELEASE THE PAYLOAD OR THE ARM/PAYLOAD COMBINATION CAN BE JETTISONED. CREW TRAINING ---------- CREW WILL BE TRAINED TO RECOGNIZE OFF NOMINAL EE OPERATIONS AND TO MANEUVER THE ORBITER AWAY FROM A FREE FLYING PAYLOAD AT ANY TIME DURING ARM OPERATIONS. MISSION CONSTRAINT ---------- WHEN CAPTURING A FREE FLYING PAYLOAD, THE EE MUST BE FAR ENOUGH AWAY FROM STRCUTURE TO PROHIBIT CONTACT REGARDLESS OF PAYLOAD ROTATIONS. THE EE MODE SWITCH SHOULD BE PLACED BACK IN THE OFF POSITION IMMEDIATELY AFTER THE SPEC DRIVE TIME HAS ELAPSED. OMRSD OFFLINE ---------- VERIFY EEEU BITE FLAG NOT PRESENT OMRSD ONLINE INSTALLATION ---------- NONE OMRSD ONLINE TURNAROUND ---------- VERIFY ABE DATA FOR NO EEEU BITE AND ABE FAILURE WARNING

PREPARED BY: MFWG
SUPERCEDING DATE: 06 OCT 87
DATE: 24 JUL 91
CIL REV: 2