

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 5114071177

SHEET: 1

P/N & REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RISK / YMC. 2/IRAD CRITICALITY RATIONALE FOR ACCEPTANCE
3150	0	MOTOR DRIVE RELAY QTY-6 P/N MS27743-1 AND ZENER DIODES. INTER-CONNECTION DIAGRAM 2563716	MODE: N.O. CONTACT FAILS TO N.C. CONTACT. CAUSE(S): (1) ROCKER ARM FAILURE IN RELAY.	ADDITIONAL LOAD SEEN BY THE MOTOR DRIVE. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNOUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING ----- POWER SWITCHES (NOT SHORTED)	DESIGN FEATURES ----- RELAYS ARE HERMETICALLY SEALED TYPES, CONFORMING TO MIL-R-39016 OR MIL-R-6104 AS DICTATED BY THE DESIGN APPLICATION. IN ADDITION, ALL RELAYS ARE SCREENED TO NASA ST-R-0001 REQUIREMENTS. CONTACT CURRENT AND VOLTAGE STRESSES ARE REDUCED IN ACCORDANCE WITH THE DERATING REQUIREMENTS OF SPAR-RMS-PA.003. IN THE PACKAGING DESIGN, EMPHASIS HAS BEEN PLACED UPON RELAY MOUNTING TO ENSURE GOOD HEAT TRANSFER AND IMMUNITY FROM VIBRATION.

RMS/ELEC - 825

PREPARED BY: NMG _____ SUPERSEDING DATE: 11 SEP 66 APPROVED BY: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51140F1177

SHEET: 2

ITER REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FUNC. 2/TRAD CRITICALITY	RATIONALE FOR ACCEPTANCE
3150	0	MOTOR DRIVE RELAY QTY: 6 P/N MS27743-1 AND ZENER DIODES. INTER-CONNECTION DIAGRAM 2563716	MODE: N.O. CONTACT FAILS TO M.C. CONTACT. CAUSE(S): (1) ROCKER ARM FAILURE IN RELAY.	ADDITIONAL LOAD SEEN BY THE MOTOR DRIVE. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNOUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING ----- POWER SWITCHES (NOT SHORTED)		<p>ACCEPTANCE TESTS ----- THE SPA IS SUBJECTED TO THE FOLLOWING ENVIRONMENTAL TESTING AS AN SRU.</p> <p>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 4</p> <p>O THERMAL: PLUS 70 DEGREES C TO -25 DEGREES C DURATION - 1 1/2 CYCLES</p> <p>THE SPA IS THEN TESTED AS PART OF THE JOINTS ACCEPTANCE TESTS (VIBRATION AND THERMAL VACUUM TEST).</p> <p>THE SPA'S/JOINTS UNDERGO RMS SYSTEM TESTS (TP518 RMS STRONGBACK AND TP552 FEAT FLOOR TESTS) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE.</p> <p>QUALIFICATION TESTS ----- THE SPA IS SUBJECTED TO THE FOLLOWING SRU QUALIFICATION TEST ENVIRONMENTS. THE SPA WAS ALSO TESTED AS PART OF THE JOINT QUALIFICATION TESTS.</p> <p>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 4</p> <p>O SHOCK: 20G/11 MS/3 AXES (6 DIRECTIONS)</p> <p>O THERMAL VAC: +01 DEGREES C TO -36 DEGREES C (6 CYCLES) 1X10⁻⁶ Torr</p> <p>O HUMIDITY: TESTED WITH THE SHOULDER JOINT</p> <p>O ENC: MIL-SID-461 AS MODIFIED BY SL-E-0002 (TEST CE01, CE03, CS01, CS02, CS06, RE01, RE02 (N/B), RS01)</p> <p>FLIGHT CHECKOUT ----- PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987</p>

RMS/ELEC - 826

PREPARED BY: MFWG

SUPERSEDING DATE: 11 SEP 86

APPROVED BY: _____

CI REAL ITEM LIST

PROJECT: RMS
 ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: S1120FT177

SHEET: 3

ITER REF.	REV.	WIRE, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FUNC. 2/1RAB CRITICALITY	RATIONALE FOR ACCEPTANCE
3150	0	MOTOR DRIVE RELAY QTY-6 P/N MS27743-1 AND ZENER DIODES. INTER-CONNECTION DIAGRAM 2563716	MODE: N.O. CONTACT FAILS TO N.C. CONTACT. CAUSE(S): (1) ROCKER ARM FAILURE IN RELAY.	ADDITIONAL LOAD SEEN BY THE MOTOR DRIVE. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING ----- POWER SWITCHES (NOT SHORTED)	QA/INSPECTIONS	<p>MOTOR DRIVE RELAYS ARE PROCURED AS A EEE QUALIFIED PRODUCT IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION MIL-R-39016 AS REQUIRED BY SPAR-RMS-PA.003. ADDITIONALLY ALL RELAYS ARE 100% SCREENED TO THE REQUIREMENTS OF JSC SPECIFICATION ST-R.001 AS REQUIRED BY SPAR-RMS-PA.003. SCREENING TESTING CONSIST OF THERMAL SHOCK, HIGH AND LOW TEMPERATURE OPERATION, INSULATION RESISTANCE, CONTACT RESISTANCE, OPERATING VOLTAGES, RADIOGRAPHIC INSPECTION AND PIND TEST.</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-81581 AND INSPECTED AND TESTED TO NASA JSC8000 STANDARD NUMBER 05A.</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 MHB 5300.4(3A) STANDARD, AS MODIFIED BY JSC 08800A.</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</p>

RMS/ELEC - 827

PREPARED BY: HMG

SUPERSEDING DATE: 11 SEP 86

APPROVED BY:

DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 511401177 SHEET: 4

AREA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HOW / FUNC. 2/TRAD CRITICALITY	RATIONALE FOR ACCEPTANCE
3150	0	MOTOR DRIVE RELAY QTY-6 P/N MS27743-1 AND ZENER DIODES. INTER-CONNECTION DIAGRAM 2563716	MODE: N.O. CONTACT FAILS TO M.C. CONTACT. CAUSE(S): (1) ROCKER ARM FAILURE IN RELAY.	ADDITIONAL LOAD SEEN BY THE MOTOR DRIVE. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING POWER SWITCHES (NOT SHORTED)	HOWR / FUNC. 2/TRAD CRITICALITY	<p>VERIFICATION TO AS DESIGN ETC., (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 UNIT TO JOINT SRU - INSPECTIONS INCLUDE GROUNDING CHECKS, CONNECTORS FOR BENT OR PUSHBACK CONTACTS, VISUAL, CLEANLINESS, INTERCONNECT WIRING AND POWER UP TEST TO THE APPROPRIATE JOINT INSPECTION TEST PROCEDURE (ITP) ETC.</p> <p>JOINT LEVEL PRE-ACCEPTANCE TEST INSPECTION, INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC.</p> <p>JOINT LEVEL 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 - 828

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 5114071177

SHEET: 5

AREA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/1RAB CRITICALITY	RATIONALE FOR ACCEPTANCE
3150	0	MOTOR DRIVE RELAY Q1Y-6 P/N MS27743-1 AND ZENER DIODES. INTER-CONNECTION DIAGRAM 2563716	MODE: N.O. CONTACT FAILS TO N.C. CONTACT. CAUSE(S): (1) ROCKER ARM FAILURE IN RELAY.	ADDITIONAL LOAD SEEN BY THE MOTOR DRIVE. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING ----- POWER SWITCHES (NOT SHORTED)	FAILURE HISTORY -----	THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

RMS/ELEC - 829

PREPARED BY: MFWG

SUPERSEDING DATE: 11 SEP 86

APPROVED BY:

E: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 5114071177

SHEET: **6**

THEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RDWR / FUNC. 2/1RAD CRITICALITY	RATIONALE FOR ACCEPTANCE
3150	0	MOTOR DRIVE RELAY QTY-6 P/N MS27743-1 AND ZENER DIODES. INTER CONNECTION DIAGRAM 2563716	MODE: N.O. CONTACT FAILS TO M.C. CONTACT. CAUSE(S): (1) ROCKER ARM FAILURE IN RELAY.	ADDITIONAL LOAD SEEN BY THE MOTOR DRIVE. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNOUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING POWER SWITCHES (NOT SHORTED)		<p>OPERATIONAL EFFECTS</p> <p>WITH SUBSEQUENT FAILURE ONE JOINT FAILS FREE. THE FAILED JOINT IS ONLY RESTRAINED BY GEARBOX FRICTION. ARM MAY BACKDRIVE IF BRAKES ARE OFF AND ANY OF THE OTHER JOINTS ARE DRIVEN. ARM WILL TAKE AN UNEXPECTED TRAJECTORY IN COMPUTER SUPPORTED MODES. NO DRIVE MODES AVAILABLE FOR FAILED JOINT. ARM MAY BE JETTISONED. OPERATOR WILL INHERENTLY COMPENSATE.</p> <p>CREW ACTION</p> <p>APPLY BRAKES. USE DIRECT DRIVE TO POSITION OTHER JOINTS FOR JETTISON.</p> <p>CREW TRAINING</p> <p>THE CREW SHOULD BE TRAINED TO ALWAYS OBSERVE WHETHER THE ARM IS RESPONDING PROPERLY TO COMMANDS. IF IT ISN'T, APPLY BRAKES.</p> <p>MISSION CONSTRAINT</p> <p>THE CREW SHOULD BE TRAINED TO OPERATE UNDER VERNIER RATES WITHIN 10 FT OF STRUCTURE. AUTO TRAJECTORIES MUST BE DESIGNED TO COME NO CLOSER THAN 5 FT FROM STRUCTURE. THE OPERATOR MUST BE ABLE TO DETECT THAT THE ARM IS RESPONDING PROPERLY TO COMMANDS VIA WINDOW AND/OR CCTV VIEWS DURING ALL ARM OPERATIONS.</p> <p>SCREEN FAILURES</p> <p>A: INDEPENDENT PATH NOT INSTRUMENTED. B: INDEPENDENT PATH NOT INSTRUMENTED.</p> <p>OMRSD OFFLINE</p> <p>NONE</p> <p>OMRSD ONLINE INSTALLATION</p> <p>NONE</p> <p>OMRSD ONLINE TURNAROUND</p>

RMS/ELEC - 830

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: STROVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51120F1177

SHEET: 7

ITEM REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW ? FURC. 2/IRAB CRITICALITY	RATIONALE FOR ACCEPTANCE
5150	0	MOTOR DRIVE RELAY QTY 6 P/N MS27743-1 AND ZENER DIODES. INTER-CONNECTION DIAGRAM 2563716	MODE: N.O. CONTACT FAILS TO M.C. CONTACT. CAUSE(S): (1) ROCKER ARM FAILURE IN RELAY.	ADDITIONAL LOAD SEEN BY THE MOTOR DRIVE. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE UNEXPECTED MOTION. UNANNOUNCED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING POWER SWITCHES (NOT SHORTED)	NONE	

RMS/ELEC - 831

PREPARED BY: MEWG

SUPERSEDING DATE: 11 SEP 86

APPROVED BY:

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