

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: SE... HER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 511407177 SHEET: 1

P/N & REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. I/F CRITICALITY	RATIONALE FOR ACCEPTANCE
1060	2	POWER SIGNAL CONTROLLER QTY 6 SCHEMATIC 2563717	MODE: JOINT FAILS FREE. CAUSE(S): (1) P/M SIGNAL INVERTER FAILURE. (2) LOSS OF 10KHZ SWITCHING. (3) LOSS OF 1.6 MHZ SIGNAL FROM TC. (4) INTERNAL PARTS FAILURE. (5) LOSS OF +10V.	MOTOR SWITCHES WILL NOT FUNCTION. CONSISTENCY CHECK MAY NOT INITIATE AUTO BRAKES UNDER CERTAIN CONDITIONS. (END OKD FLAG SET BY DIRECTION FLAG ONLY). WORST CASE UNEXPECTED MOTION. FREE JOINT. UNANNOUNCED CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING ----- N/A		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.001. SPECIAL HANDLING PRECAUTIONS ARE USED AT ALL STAGES OF MANUFACTURE TO PRECLUDE DAMAGE/STRESS DUE TO ELECTROSTATIC DISCHARGE.

RMS/ELEC - 729

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 511407117

SHEET: 2

P/N & REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOWR / FUNC. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
3060	2	POWER SIGNAL CONTROLLER QTY-6 SCHEMATIC 2563717	<p>MODE: JOINT FAILS FREE.</p> <p>CAUSE(S): (1) PWR SIGNAL INVERTER FAILURE. (2) LOSS OF 10KHZ SWITCHING. (3) LOSS OF 1.6 MHZ SIGNAL FROM TE. (4) INTERNAL PARTS FAILURE. (5) LOSS OF +10V.</p>	<p>MOTOR SWITCHES WILL NOT FUNCTION. CONSISTENCY CHECK MAY NOT INITIATE AUTO BRAKES UNDER CERTAIN CONDITIONS. (FWD BND FLAG SET BY DIRECTION FLAG ONLY).</p> <p>WORST CASE ----- UNEXPECTED MOTION. FREE JOINT. UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>		<p>ACCEPTANCE TESTS ----- THE SPA IS SUBJECTED TO THE FOLLOWING ENVIRONMENTAL TESTING AS AN SRU.</p> <p>0 VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 4 0 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 (TPS18 RMS STRONGBACK AND TPSS2 FLAT 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>0 VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 4 0 SHOCK: 20G/11 MS/3 AXES (6 DIRECTIONS) 0 THERMAL VAC: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1X10⁻⁶ TORR 0 HUMIDITY: TESTED WITH THE SHOULDER JOINT 0 EMC: MIL-STD-461 AS MODIFIED BY SL-E-0002 (TEST C101, C201, CS01, CS02, CS06, RE01, RE02 (M/B), RS01)</p> <p>FLIGHT CHECKOUT ----- PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16907</p>

RMS/ELEC - 730

PREPARED BY: MYNG

SUPERSEDING DATE: 06 OCT 87

APPROVED BY: _____

CITICAL ITEMS LIST

PROJECT: SAMS
ASS'Y NAME/PARTURE: STRV

AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 5178071177

SHEET: 1

ITEM REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOWR / FUNC. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
3060	2	POWER SIGNAL CONTROLLER QTY-6 SCHEMATIC 2563717	<p>MODE: JOINT FAILS FREE.</p> <p>CAUSE(S): (1) PPM SIGNAL INVERTER FAILURE. (2) LOSS OF 10KHZ SWITCHING. (3) LOSS OF 1.6 MHZ SIGNAL FROM TE. (4) INTERNAL PARTS FAILURE. (5) LOSS OF +10V.</p>	<p>MOTOR SWITCHES WILL NOT FUNCTION. CONSISTENCY CHECK MAY NOT INITIATE AUTO BRAKES UNDER CERTAIN CONDITIONS. (END BRD FLAG SET BY DIRECTION FLAG ONLY).</p> <p>WORST CASE UNEXPECTED FREE JOINT. UNANNOUNCED CREW ACTION REQUIRED.</p> <p>REUNDANT PATHS REMAINING</p> <p>N/A</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 SA 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-01381 AND INSPECTED AND TESTED TO NASA JSC8080 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 MHD 5300.4(1A) STANDARD, AS MODIFIED BY JSC 00000A.</p> <p>CONFORMAL COATING INSPECTION FOR ADEQUATE PROCESSING IS PERFORMED USING ULTRAVIOLET LIGHT TECHNIQUES.</p> <p>POST P.C. BD. INSTALLATION INSPECTION, CLEANLNESS 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 CLEANLNESS (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 - 731

PREPARED BY: MWG

SUPERSEDING DATE: 06 OCT 07

APPROVED BY:

DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 511007177

SHEET: 4

P/N & REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	JDMR / FUNC. I/I	CRITICALITY	RATIONALE FOR ACCEPTANCE
1060	2	POWER SIGNAL CONTROLLER QTY 6 SCHEMATIC 2561717	<p>MODE: JOINT FAILS FREE.</p> <p>CAUSE(S):</p> <p>(1) PWM SIGNAL INVERTER FAILURE.</p> <p>(2) LOSS OF 10KHZ SWITCHING.</p> <p>(3) LOSS OF 1.6 MHZ SIGNAL FROM IC.</p> <p>(4) INTERNAL PARTS FAILURE.</p> <p>(5) LOSS OF +10V.</p>	<p>MOTOR SWITCHES WILL NOT FUNCTION. CONSISTENCY CHECK MAY NOT INITIATE AUTO BRAKES UNDER CERTAIN CONDITIONS. (FWD BRO FLAG SET BY DIRECTION FLAG ONLY).</p> <p>WORST CASE</p> <p>UNEXPECTED MOTION. FREE JOINT. UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING</p> <p>N/A</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 SRM - INSPECTIONS INCLUDE GROUNDING CHECKS, CONNECTORS FOR BENT OR PUSHBACK CONTACTS, VISUAL CLEANLINESS, INTERCONNECT HEARING AND POWER UP TEST TO THE APPROPRIATE JOINT INSPECTION TEST PROCEDURE (IIP) 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 - 732

PREPARED BY: HYMG

SUPERSEDING DATE: 06 OCT 87

APPROVED BY: _____

CRITICAL ITEMS LIST

PROJECT: SDMS
ASSY NAME: FEATURE

POWER APPLICATION

SYSTEM: ELECTRICAL SUBSYSTEM
ASSY P/N: 511401177

SHEET: 3

ITEM REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FUNC. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
1060	2	POWER SIGNAL CONTROLLER QTY-6 SCHEMATIC 7561717	<p>MODE: JOINT FAILS FREE.</p> <p>CAUSE(S):</p> <p>(1) PWM SIGNAL INVERTER FAILURE.</p> <p>(2) LOSS OF 10KHZ SWITCHING.</p> <p>(3) LOSS OF 1.6 MHZ SIGNAL FROM FE.</p> <p>(4) INTERNAL PARTS FAILURE.</p> <p>(5) LOSS OF +10V.</p>	<p>MOTOR SWITCHES WILL NOT FUNCTION. CONSISTENCY CHECK MAY NOT INITIATE AUTO BRAKES UNDER CERTAIN CONDITIONS. (TMD BRK FLAG SET BY DIRECTION FLAG ONLY).</p> <p>WORST CASE</p> <p>UNEXPECTED MOTION. FREE JOINT. UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING</p> <p>N/A</p>		<p>FAILURE HISTORY</p> <p>THE FOLLOWING FAILURE ANALYSIS REPORT(S) ARE RELEVANT:</p> <p>FAR 102B: S/N 701 FEB 79</p> <p>DESCRIPTION</p> <p>NDA CHANNELS FAILED. CAPACITORS HAD FRACTURED LEADS DUE TO INADEQUATE STRAPPING</p> <p>CORRECTIVE ACTION</p> <p>RE-STRAPPED TO WRD PADS. ALL JPC'S AND BDA'S.</p> <p>FAR 1106: S/N 101 OCT 80</p> <p>DESCRIPTION</p> <p>RATE ERROR CAUSED BY FAILURE OF U221 F3318(RCA- 4017AK)</p> <p>CORRECTIVE ACTION</p> <p>REPLACED U221 AND OTHER OVERSTRESSED COMPONENTS.</p>

RMS/ELEC - 733

PREPARED BY: PHUG

SUPERCEDING DATE: 06 OCT 87

APPROVED BY: _____

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y P/N: 517407177

SHEET: 6

PMA REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
3060	2	POWER SIGNAL CONTROLLER QTY-6 SEMENATIC 2563717	<p>MODE: JOINT FAILS FREE.</p> <p>CAUSE(S):</p> <p>(1) PMM SIGNAL INVERTER FAILURE.</p> <p>(2) LOSS OF 10KHZ SWITCHING.</p> <p>(3) LOSS OF 1.6 MHZ SIGNAL FROM TE.</p> <p>(4) INTERNAL PARTS FAILURE.</p> <p>(5) LOSS OF +10V.</p>	<p>MOTOR SWITCHES WILL NOT FUNCTION. CONSISTENCY CHECK MAY NOT INITIATE AUTO BRAKES UNDER CERTAIN CONDITIONS. (FWD BRD FLAG SET BY DIRECTION FLAG ONLY).</p> <p>WORST CASE</p> <p>UNEXPECTED MOTION. FREE JOINT. UNANNOUNCATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING</p> <p>N/A</p>		<p>OPERATIONAL EFFECTS</p> <p>ARM DOES NOT RESPOND PROPERLY TO HAND CONTROLLER COMMANDS OR AUTO SEQUENCES. CREW INHERENTLY COMPENSATES FOR ANY UNDESIRED ARM TRAJECTORY IN MANUAL AUGMENTED MODES.</p> <p>CREW ACTION</p> <p>APPLY BRAKES. SELECT BACKUP.</p> <p>CREW TRAINING</p> <p>THE CREW WILL BE TRAINED TO OBSERVE WHETHER THE ARM IS RESPONDING PROPERLY TO COMMANDS. IF IT ISN'T, APPLY BRAKES.</p> <p>MISSION CONSTRAINT</p> <p>OPERATE UNDER VERNIER RATES WITHIN 10 FT OF 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. AUTO TRAJECTORIES MUST BE DESIGNED TO COME NO CLOSER THAN 5 FT FROM STRUCTURE.</p> <p>SCREEN FAILURES</p> <p>N/A</p> <p>OHRSO OFFLINE</p> <p>IN COMPUTER CONTROLLED MODE VERIFY JOINT RATES FOR EACH JOINT</p> <p>OHRSO ONLINE INSTALLATION</p> <p>NONE</p> <p>OHRSO ONLINE TURNAROUND</p> <p>FOR EACH JOINT IN SINGLE MODE VERIFY TACHO SIGNATURE</p>

RMS/ELEC - 734