

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NUM/CI/DATE: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM  
 ASS'Y P/N: 5114DE1177 SHEET:

AREA REF.	REV.	RAW, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW ? TIME, 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
2010	1	TIMING AND LOGIC CONTROL QTY: 6 SCHEMATIC 2563719	MODE: LOSS OF MDA CLOCK 1.6MHZ.  CAUSE(S): (1) 1.6 MHZ BUFFER. (U19E)	MDA CLOCK LOSS. JOINT WILL FAIL INTR. ARM MAY TAKE AN UNEXPECTED TRAJECTORY.  WORST CASE ..... UNEXPECTED MOTION. FREE JOINT, UNANNUNCIATED. CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING ..... N/A		DESIGN FEATURES ..... MODE FAILURE IS THE ONLY POSSIBLE CAUSE.  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 - 519

PREPARED BY: MEGL

SUPERSEDING DATE: 05 OCT 86

APPROVED BY:

**CRITICAL ITEMS LIST**

PROJECT: SRMS

ASSY Nomenclature: SERVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM  
ASSY P/N: 211401177

SHEET: 2

INHA REF.	REV.	WMT, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT IN END ITEM	HOW 7 P/WC, 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
2010	1	TIMING AND LOGIC CONTROL QTY 6 SCHEMATIC 2563719	<p>MODE: LOSS OF MDA CLOCK 1.6MHZ.</p> <p>CAUSE(S): (1) 1.6 MHZ BUFFER. (UI9C)</p>	<p>MDA CLOCK LOST. JOINT WILL FAIL FREE. ARM MAY TAKE AN UNEXPECTED TRAJECTORY.</p> <p>WORST CASE ..... UNEXPECTED MOTION. FREE JOINT. UNANNOUNCED. CREW ACTION REQUIRED.</p> <p>REDUANT PATHS REMAINING ..... N/A</p>	<p>ACCEPTANCE TESTS ..... THE SPA IS SUBJECTED TO THE FOLLOWING ENVIRONMENTAL TESTING AS AN SRU.</p> <ul style="list-style-type: none"> <li>o VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 4</li> <li>o THERMAL: PLUS 70 DEGREES C TO -25 DEGREES C DURATION - 1 1/2 CYCLES</li> </ul> <p>THE SPA IS THEN TESTED AS PART OF THE JOINTS ACCEPTANCE TESTS (VIBRATION AND THERMAL VACUUM TESTS).</p> <p>THE SPA'S/JOINTS UNDERGO RMS SYSTEM TESTS (TP510 RMS STRONGBACK AND TP552 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> <ul style="list-style-type: none"> <li>o VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 4</li> <li>o SHOCK: 20G/11 MS/3 AXES (6 DIRECTIONS)</li> <li>o THERMAL VAC: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1K10^-6 TORR</li> <li>o HUMIDITY: TESTED WITH THE SHOULDER JOINT</li> <li>o EMC: MIL-STD-461 AS MODIFIED BY SL-E-0002 (TEST CED1, CE03, CS01, CS02, CS06, RE01, RE02 (H/B), RS01)</li> </ul> <p>FLIGHT CHECKOUT ..... PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987</p>	

RMS/ELEC - 520

PREPARED BY: MFUG

SUPERSEDING DATE: 03 OCT 86

APPROVED BY:

DATE:



**CRITICAL ITEMS LIST**

PROJECT: SRMS

ASSY'S IDENTIFICATION: SERVO POWER AMPLETTA

SYSTEM: ELECTRICAL SUBSYSTEM

ASSY P/N: 21120/1177

SHEET: \_\_\_\_\_

FMEA REF.	REV.	WORK OFF. & DRAWING OFF. DESIGNATION	FAILURE MODE AND CAUSE	TYPICAL EFFECT OR END ITEM	MODE / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
2010	1	TIMING AND LOGIC CONTROL Q17 & SCHEMATIC 2561719	MODE: LOSS OF MODA CLOCK 1 AMHP  CAUSE(S): (1) 1.6 MHZ BUFFER. (UTDR)	MODA CLOCK LOSS, JOINT WILL FAIL FREE. ARM MAY TAKE AN UNEXPECTED TRAJECTORY.  WORST CASE  UNEXPECTED MOTION, FREE JOINT, UNANNUNCIATED, CREW ACTION REQUIRED.  REDUNDANT PAINS REMAINING  N/A	1/1	<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 RELIABILITY 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 BEME 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 BEME OR PUSH BACK CONTACTS ETC.</p> <p>SRMS SYSTEMS TESTING - STRONGBACK AND FLAT FLOOR AMBIENT PERFORMANCE TEST. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)</p>

PREPARED BY: MHL

DATE: 05 OCT 86

APPROVED BY:

DATE:

RMS/ELEC - 522

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: SERVO POWER AMPLIFIER

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

SHEET: 5

FMEA REF.	REV.	PART, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / WHEN / 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
2010	1	TIMING AND LOGIC CONTROL QTY: 6 SCHEMATIC 2563719	MODE: LOSS OF MDA CLOCK 1.6MHZ.  CAUSE(S): (1) 1.6 MHZ BUFFER. (UI9E)	MDA CLOCK LOST. JOINT WILL FALL FREE. ARM MAY TAKE AN UNEXPECTED TRAJECTORY.  WORST CASE ..... UNEXPECTED MOTION. FREE JOINT. UNANNOUNCED. CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING ..... N/A	FAILURE HISTORY .....	THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

PREPARED BY: HMG

DATE: 05 OCT 86

APPROVED BY:

RMS/ELEC - 523

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NUMERICAL: CRVO POWER AMPLIFIER

SYSTEM: ELECTRICAL SUBSYSTEM  
 ASS'Y P/N: 51401177

SHEET: **6**

ICRA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT IN END ITEM	HOW / TIME, %/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
2810	1	TIMING AND LOGIC CONTROL QTY 6 SCHEMATIC 2561719	MODE: LOSS OF MIA CLOCK 1.6MHZ.  CAUSE(S): (E) 1.6 MHZ BUFFER. (UIPE)	MIA CLOCK FIRST JOINT WILL TAKE FREE. ARM MAY TAKE AN UNEXPECTED TRAJECTORY.  Worst Case UNEXPECTED MOTION. FREE JOINT. UNANNUNCIATED. CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING N/A	OPERATIONAL EFFECTS  ARM DOES NOT RESPOND PROPERLY TO HAND CONTROLLER COMMANDS OR AUTO SEQUENCES. CREW INHERENTLY COMPENSATES FOR ANY UNDESIRABLE ARM TRAJECTORY IN MANUAL AUGMENTED MODES.  CREW ACTION  APPLY BRAKES. SELECT BACKUP.  CREW TRAINING  THE CREW WILL BE TRAINED TO OBSERVE WHETHER THE ARM IS RESPONDING PROPERLY TO COMMANDS. IF IT ISN'T, APPLY BRAKES.  MISSION CONSTRAINT  OPERATE UNDER VERTIER 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.  SCREEN FAILURES  N/A  CMRSD OFFLINE  DRIVE EACH JOINT IN COMPUTER SUPPORTED MODE VERIFY JOINT MOTION  CMRSD ONLINE IN-TALKATION  NONE  CMRSD ONLINE TURNAROUND  DRIVE EACH JOINT IN SINGLE MMR VERIFY TACHOMETER SIGNATURE	

PREPARED BY: NEMO

DATE: 03/01/06

APPROVED BY:

DATE:

RMS/ELEC - 524