

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED)
 ASS'Y NOMENCLATURE: MCIU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51155F160-5

SHEET: 1

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOWR / FUNC. 2/1R CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2035	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797.	<p>MODE: PERMANENT MCIU FAILURE WARNING WITH AUTOBRAKES APPLIED</p> <p>CAUSE(S): 1) SOFTWARE MCIU FAILURE WARNING/AUTO BRAKES SOURCE FAILS ON</p>	<p>A CONSTANT MCIU FAILURE WARNING IS SENT TO O&C PANEL. AUTOBRAKES ARE APPLIED. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. MCIU FAILURE WARNING TEST WILL FAIL. BRAKE TRUTH TABLE TEST WILL FAIL. LOSS OF LIMPING DURING END EFFECTOR CAPTURE.</p> <p>WORST CASE ----- UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY.</p> <p>REDUNDANT PATHS REMAINING ----- TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (TO SECURE ORBITER)</p>	<p>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.</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.003. SPECIAL HANDLING PRECAUTIONS ARE USED AT ALL STAGES OF MANUFACTURE TO PRECLUDE DAMAGE/STRESS DUE TO ELECTROSTATIC DISCHARGE.</p>

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 ASS'Y P/N: 51155F160-5

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
2035	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797.	MODE: PERMANENT MCIU FAILURE WARNING WITH AUTOBRAKES APPLIED CAUSE(S): 1) SOFTWARE MCIU FAILURE WARNING/AUTO BRAKES SOURCE FAILS ON	A CONSTANT MCIU FAILURE WARNING IS SENT TO D&C PANEL. AUTOBRAKES ARE APPLIED. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. MCIU FAILURE WARNING TEST WILL FAIL. BRAKE TRUTH TABLE TEST WILL FAIL. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. WORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (TO SECURE ORBITER)		ACCEPTANCE TESTS ----- THE MCIU IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTING AS AN LRU. O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 3.2 O THERMAL: +40 DEGREES C TO -16 DEGREES C (2 CYCLES) QUALIFICATION TESTS ----- THE MCIU IS SUBJECTED TO THE FOLLOWING LRU QUALIFICATION ENVIRONMENTS: O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 3.2 O SHOCK: BY SIMILARITY TO -3 MCIU O THERMAL: +51 DEGREES C TO -27 DEGREES C (10 CYCLES) O HUMIDITY: BY SIMILARITY TO -3 MCIU O EMC: MIL-STD-461 AS MODIFIED BY SL-E-0002 (TESTS CE01, CE03, CS01, CS02, CS06, RE02 (N/B), RS01, RS02) O LIFE: 630 OPERATING HOURS 1000 POWER ON/OFF CYCLES FLIGHT CHECKOUT ----- PORS OPS CHECKLIST (ALL VEHICLES) JSC 16987

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EXPEDITE
 PRODUCTION

PREPARED BY: MFMG

SUPERCEDING DATE: NONE

DATE: 11 JUL 91

CIL REV: 0

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PROJECT: SRMS (-5 MCIU INSTALLED)
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 ASS'Y P/N: 51155F160-5

SHEET: 3

FMEA REF.	FMEA REV.	NAME QTY. & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOWR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2035	0	FAILURE DETECTOR QTY. 1, SCHEMATIC 612797.	<p>MODE: PERMANENT MCIU FAILURE WARNING WITH AUTOBRAKES APPLIED</p> <p>CAUSE(S): 1) SOFTWARE MCIU FAILURE WARNING/AUTO BRAKES SOURCE FAILS ON</p>	<p>A CONSTANT MCIU FAILURE WARNING IS SENT TO D&C PANEL. AUTOBRAKES ARE APPLIED. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. MCIU FAILURE WARNING TEST WILL FAIL. BRAKE TRUTH TABLE TEST WILL FAIL. LOSS OF LIMPING DURING END EFFECTOR CAPTURE.</p> <p>WORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY.</p> <p>REDUNDANT PATHS REMAINING</p> <p>TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP BRIVE 3) JETTISON (TO SECURE ORBITER)</p>		<p>QA/INSPECTIONS</p> <p>DOCUMENTED QUALITY CONTROLS ARE EXERCISED THROUGHOUT DESIGN PROCUREMENT, PLANNING, RECEIVING, PROCESSING FABRICATION, ASSEMBLY, TESTING AND SHIPPING OF THE MCIU. GOVERNMENT SOURCE INSPECTION IS INVOKED AT VARIOUS LEVELS OF COMPONENT ASSEMBLY AND TEST OPERATIONS. MANDATORY INSPECTION POINTS ARE EMPLOYED AT VARIOUS LEVELS OF ASSEMBLY AND 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, INSPECTED, AND TESTED TO SPAR-RMS-PA.003.</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-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> <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</p>

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PREPARED BY: MFVG

SUPERSEDING DATE: NONE

RMS/ELEC - 81

DATE: 11 JUL 91

CIL REV: 0

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED)
 ASS'Y NOMENCLATURE: MCIU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51355FT60-5

SHEET: 4

FMEA REF.	FMEA REV.	NAME, QTY. & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HDWR / FUNC. 2/1R CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2035	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797.	MODE: PERMANENT MCIU FAILURE WARNING WITH AUTOBRAKES APPLIED CAUSE(S): 1) SOFTWARE MCIU FAILURE WARNING/AUTO BRAKES SOURCE FAILS ON	A CONSTANT MCIU FAILURE WARNING IS SENT TO D&C PANEL. AUTOBRAKES ARE APPLIED. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. MCIU FAILURE WARNING TEST WILL FAIL. BRAKE TRUTH TABLE TEST WILL FAIL. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. WORST CASE ----- UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING ----- TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (TO SECURE ORBITER)	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). ACCEPTANCE TESTING (ATP) INCLUDES AMBIENT, VIBRATION, AND THERMAL TESTING (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT).

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SUPERCEDING DATE: NONE

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CIL REV: 0

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PROJECT: SRMS (-5 MCIU INSTALLED)
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SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51155FT60-5

SHEET: 5

FMEA REF.	FMEA REV.	NAME, QTY. & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / UNC. 2/1R CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2035	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797.	MODE: PERMANENT MCIU FAILURE WARNING WITH AUTOBRAKES APPLIED CAUSE(S): 1) SOFTWARE MCIU FAILURE WARNING/AUTO BRAKES SOURCE FAILS ON	A CONSTANT MCIU FAILURE WARNING IS SENT TO O&C PANEL. AUTOBRAKES ARE APPLIED. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. MCIU FAILURE WARNING TEST WILL FAIL. BRAKE TRUTH TABLE TEST WILL FAIL. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. WORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (TO SECURE ORBITER)	FAILURE HISTORY ----- THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

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SUPERCEDING DATE: NONE

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DATE: 11 JUL 91

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SHEET: 6

FMEA REF.	FMEA REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2035	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797.	MODE: PERMANENT MCIU FAILURE WARNING WITH AUTOBRAKES APPLIED CAUSE(S): 1) SOFTWARE MCIU FAILURE WARNING/AUTO BRAKES SOURCE FAILS ON	A CONSTANT MCIU FAILURE WARNING IS SENT TO O&C PANEL. AUTOBRAKES ARE APPLIED. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. MCIU FAILURE WARNING TEST WILL FAIL. BRAKE TRUTH TABLE TEST WILL FAIL. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. WORST CASE ----- UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING ----- TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (TO SECURE ORBITER)		OPERATIONAL EFFECT ----- AUTOBRAKES. DIRECT DRIVE AND BACKUP AVAILABLE. LOSS OF LIMPING. LOSS OF COMPUTER SUPPORTED MODES. CREW ACTION ----- SELECT DIRECT DRIVE. SINGLE/DIRECT DRIVE SWITCH SHOULD BE PULSED TO MAINTAIN PROPER RATES. CREW TRAINING ----- CREW IS TRAINED TO ALWAYS OBSERVE WHETHER THE ARM IS RESPONDING PROPERLY TO COMMANDS. MISSION CONSTRAINT ----- NONE

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SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51155F160-5

SHEET: 7

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HWR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
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PREPARED BY: MFWG SUPERSEDING DATE: NONE

RMS/ELEC - 85

DATE: 11 JUL 91 CIL REV: 0

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED)
 ASS'Y NOMENCLATURE: MCIU

SYSTEM: ELECTRICAL SUBSYSTEM
 ASS'Y P/N: 51155F180-5

SHEET: 8

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOWR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
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