

**CRITICAL ITEMS LIST**

PROJECT: SAMS (-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	HDWR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2015	0	ANALOG INTERFACE. QTY. 1. SCHEMATIC 812742	<p>MODE: CORRUPT DATA FROM ANALOG INTERFACE-- MCPC</p> <p>CAUSE(S):                      1) ONE OR MORE MCPC VOLTAGE CHANNELS OF MULTIPLEXER FAIL.                      2) MCPC VOLTAGE DIVIDER CIRCUITS FAIL.</p>	<p>ERRONEOUS DATA FROM THE MADC WILL BE DETECTED BY MCPC OUT OF TOLERANCE CHECKS. ANALOG DATA INVALID. MCIU FAILURE WARNING. AUTOBRAKES. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. D&amp;C AND ABE COMMUNICATION PATHS REMAIN OPERABLE. GPC 1/D IS NOT LOST. LOSS OF LIMPING DURING END EFFECTOR CAPTURE.</p> <p>WORST CASE                      -----                      UNEXPECTED MOTION. SIX JOINT RUNAWAY. AUTOBRAKES.</p> <p>REDUNDANT PATHS REMAINING                      -----                      1) AUTOBRAKES (FOR SAFING THE SYSTEM)                      2) DIRECT DRIVE (FOR CONTINUING OPERATIONS)</p>	<p>DESIGN FEATURES                      -----                      MULTIPLEXING IS PERFORMED USING A GATED FET SWITCH DEVICE. THE DEVICE USES CMOS TECHNOLOGY. CLOCK, FRAME SYNCH., ENABLE, READ IN STROBE, AND MADC SELECT ARE PROCESSED BY STANDARD CMOS LOGIC DEVICES.</p> <p>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.</p> <p>DISCRETE SEMICONDUCTOR DEVICES SPECIFIED TO AT LEAST THE 1X 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>COMPARATORS AND OPERATIONAL AMPLIFIERS ARE STANDARD LINEAR INTEGRATED CIRCUITS WITH MATURE MANUFACTURING TECHNOLOGY. APPLICATION CONSTRAINTS ARE IN ACCORDANCE WITH SPAR-RMS-PA.003.</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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IMMEDIATE PROCESSING

PREPARED BY: MFWG SUPERCEDING DATE: NONE 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: 51155F160-5

SHEET: 2

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
2015	0	ANALOG INTERFACE. QTY. 1. SCHEMATIC 812742	<p>MODE: CORRUPT DATA FROM ANALOG INTERFACE -- MCPC</p> <p>CAUSE(S):                      1) ONE OR MORE MCPC VOLTAGE CHANNELS OF MULTIPLEXER FAIL.                      2) MCPC VOLTAGE DIVIDER CIRCUITS FAIL.</p>	<p>ERRONEOUS DATA FROM THE MADC WILL BE DETECTED BY MCPC OUT OF TOLERANCE CHECKS. ANALOG DATA INVALID. MCIU FAILURE WARNING. AUTOBRAKES. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. D&amp;C AND ABE COMMUNICATION PATHS REMAIN OPERABLE. GPC I/O IS NOT LOST. LOSS OF LIMPING DURING END EFFECTOR CAPTURE.</p> <p>WORST CASE                      UNEXPECTED MOTION.                      SIX JOINT RUNAWAY.                      AUTOBRAKES.</p> <p>REDUNDANT PATHS REMAINING                      -----                      1) AUTOBRAKES (FOR SAFING THE SYSTEM)                      2) DIRECT DRIVE (FOR CONTINUING OPERATIONS)</p>		<p>ACCEPTANCE TESTS                      -----                      THE MCIU IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTING AS AN LRU.</p> <p>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 3.2                      O THERMAL: +40 DEGREES C TO -16 DEGREES C (2 CYCLES)</p> <p>QUALIFICATION TESTS                      -----                      THE MCIU IS SUBJECTED TO THE FOLLOWING LRU QUALIFICATION ENVIRONMENTS:</p> <p>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 ENC: 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</p> <p>FLIGHT CHECKOUT                      -----                      PORS OPS CHECKLIST (ALL VEHICLES) JSC 16987</p>

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**CRITICAL ITEMS LIST**

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

SYSTEM: ELECTRICAL SUBSYSTEM  
 ASS'Y P/N: 51155FT80-5

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
2015	0	ANALOG INTERFACE. QTY. 1. SCHEMATIC 812742	<p>MODE: CORRUPT DATA FROM ANALOG INTERFACE-- MCPC</p> <p>CAUSE(S):                      1) ONE OR MORE MCPC CHANNELS OF MULTIPLEXER FAIL.                      2) MCPC VOLTAGE DIVIDER CIRCUITS FAIL.</p>	<p>ERRONEOUS DATA FROM THE MADC WILL BE DETECTED BY MCPC OUT OF TOLERANCE CHECKS. ANALOG DATA INVALID. MCIU FAILURE WARNING. AUTOBRAKES. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. DAC AND ABE COMMUNICATION PATHS REMAIN OPERABLE. GPC I/O IS NOT LOST. LOSS OF LIMPING DURING END EFFECTOR CAPTURE.</p> <p>WORST CASE                      -----                      UNEXPECTED MOTION. SIX JOINT RUNAWAY. AUTOBRAKES.</p> <p>REDUNDANT PATHS REMAINING                      -----                      1) AUTOBRAKES (FOR SAFING THE SYSTEM)                      2) DIRECT DRIVE (FOR CONTINUING OPERATIONS)</p>	<p>QA/INSPECTIONS                      -----                      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 100X SCREENED AND BURNED IN, AS A MINIMUM, AS REQUIRED BY SPAR-RMS-PA.003, BY THE SUPPLIER. ADDITIONALLY, EEE PARTS ARE 100X 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: MFWG

SUPERCEDING DATE: NONE F

DATE: 11 JUL 91 CIL REV: 0

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

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

SHEET: 4

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
2015	0	ANALOG INTERFACE. QTY. 1. SCHEMATIC 812742	MODE: CORRUPT DATA FROM ANALOG INTERFACE-- MCPC  CAUSE(S): 1) ONE OR MORE MCPC VOLTAGE CHANNELS OF MULTIPLEXER FAIL. 2) MCPC VOLTAGE DIVIDER CIRCUITS FAIL.	ERRONEOUS DATA FROM THE MADC WILL BE DETECTED BY MCPC OUT OF TOLERANCE CHECKS. ANALOG DATA INVALID. MCIU FAILURE WARNING. AUTOBRAKES. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. D&C AND ABE COMMUNICATION PATHS REMAIN OPERABLE. GPC I/O IS NOT LOST. LOSS OF LIMPING DURING END EFFECTOR CAPTURE.  WORST CASE ----- UNEXPECTED MOTION. SIX JOINT RUNAWAY. AUTOBRAKES.  REDUNDANT PATHS REMAINING ----- 1) AUTOBRAKES (FOR SAFING THE SYSTEM) 2) DIRECT DRIVE (FOR CONTINUING OPERATIONS)	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. - MANDITORY INSPECTION POINT).

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PREPARED BY: MFWG

SUPERCEDING DATE: NONE

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**CRITICAL ITEMS LIST**

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

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

SHEET: 5

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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**CRITICAL ITEMS LIST**

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

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

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
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PREPARED BY: MFVG SUPERSEDING DATE: NONE

DATE: 11 JUL 91 CIL REV: 0

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DATE  
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