CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU 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
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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)	DESIGN FEATURES --- THE BRAKE DRIVER IS IMPLEMENTED USING FET POWER TRANSISTORS, CONNECTED IN A SERIES REDUNDANT CONFIGURATION. THE CIRCUIT EMPLOYS CONTINUOUS TESTING TO VERIFY THE INTEGRITY OF THE BRAKE DRIVE CIRCUIT. THE D&C BRAKE SWITCH CONTROLS THE OPERATION OF THE BRAKE DRIVER THROUGH AN OPTO-ISOLATOR WHICH ACTS AS A SOLID-STATE RELAY. OPTO-ISOLATORS (DIODE AND TRANSISTOR) MEET THE SAME QUALITY AND APPLICATION CRITERIA THAT HAVE BEEN APPLIED TO DISCRETE SEMICONDUCTORS. INDUCTORS ARE DESIGNED SPECIFICALLY FOR THE APPLICATION. THE DESIGN CRITERIA, INCLUDING CHOICE OF MATERIALS AND TEST REQUIREMENTS ARE IN ACCORDANCE WITH MIL-T-27. WORST CASE STRESS LEVELS DO NOT EXCEED THOSE ALLOWED BY SPAR-RMS-PA.003. 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. THE COMMAND OPTO-ISOLATOR ELEMENTS MEET THE SRMS PROGRAM REQUIREMENTS FOR SEMI-CONDUCTORS. 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. FUSES ARE PROCURED TO MSFC SPEC 40M 38259. 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. THE DIODE AND TRANSISTOR, WHICH COMPRISE AN OPTO-ISOLATOR, ARE SUBJECTED TO THE SAME QUALITY AND APPLICATION CONTROLS AS APPLIED TO DISCRETE SEMICONDUCTORS. THE BRAKING LOGIC CIRCUIT IS MADE UP OF CMOS, AN INDUCTOR, AND RESISTORS AND DIODES.

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU 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
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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 ---------- PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987

PREPARED BY: MFWG SUPERCEDING DATE: NONE DATE: 11 JUL 91 CIL REV: 0

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU 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	HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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)	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. 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. WIRE IS PROCURED, INSPECTED, AND TESTED TO SPAR-RMS-PA.003. 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. PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE, PRINTED CIRCUIT BOARD INSPECTION FOR TRACK SEPARATION, DAMAGE AND ADEQUACY OF PLATED THROUGH HOLES, COMPONENT MOUNTING INSPECTION FOR CORRECT SOLDERING, WIRE LOOPING, STRAPPING, ETC. OPERATORS AND INSPECTORS ARE TRAINED AND CERTIFIED TO NASA NHB 5300.4(3A-1) STANDARD. CONFORMAL COATING INSPECTION FOR ADEQUATE PROCESSING IS PERFORMED USING ULTRAVIOLET LIGHT TECHNIQUES. POST P.C. BD. INSTALLATION INSPECTION, CLEANLINESS AND WORKMANSHIP (SPAR/GOVERNMENT REP. MANDATORY INSPECTION POINT) P.C. BD. INSTALLATION INSPECTION, CHECK FOR CORRECT BOARD INSTALLATION, ALIGNMENT OF BOARDS, PROPER CONNECTOR CONTACT MATING, WIRE ROUTING, STRAPPING OF WIRES ETC., PRE-CLOSURE INSPECTION, WORKMANSHIP AND CLEANLINESS (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT) PRE-ACCEPTANCE TEST INSPECTION, WHICH INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC., (MANDAIORY INSPECTION POINT). A TEST READINESS REVIEW (TRR) WHICH INCLUDES VERIFICATION OF TEST PERSONNEL, TEST DOCUMENTS, TEST EQUIPMENT CALIBRATION/ VALIDATION STATUS AND HARDWARE CONFIGURATION IS CONVENED BY

PREPARED BY: MFWG SUPERCEDING DATE: NONE DATE: 11 JUL 91 CIL REV: 0

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PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU ASS'Y P/N: 51155F160-5 SHEET: 4

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
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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. - MANDITORY INSPECTION POINT).

PREPARED BY: MFWG SUPERCEDING DATE: NONE

DATE: 11 JUL 91 CIL REV: 0

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU 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	HDWR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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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CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU ASS'Y P/N: 51155F160-5 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
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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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CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU 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	HDWR / FUNC. 2/1R CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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)	SCREEN FAILURES --- N/A	

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CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU ASS'Y P/N: 51155F160-5 SHEET: 8

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
2085	0	FAILURE DETECTOR QTY. 1. SCHEMATIC 812797	MODE: BRAKE DRIVER OR PORT BRAKES STATUS OUTPUT MONITOR FAILS TO "BRAKES ON". CAUSE(S): 1) FIRST OR SECOND BRAKE DRIVE FET OR CIRCUIT FAILS OPEN. 2) PORT POWER FLAG STATUS FAILS LOW. 3) H/W WATCHDOG TIMER OR GPC AUTOBRAKES SOURCES FAILS TO "BRAKES ON". 4) S/W MCIU FAILURE WARNING AUTOBRAKES SOURCE FAILS TO "BRAKES ON". 5) PORT BRAKES STATUS OUTPUT MONITOR CIRCUIT FAILS TO "BRAKES ON". 6) LOSS OF BRAKE BUS FUSE.	FOR ALL CAUSES: BRAKE TRUTH TABLE WILL FAIL IF BRAKES ARE OFF. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSES 1), 3), 4), AND 6) BRAKES ARE APPLIED BY HARDWARE. GPC ENTERS IDLE MODE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL AND APPLY AUTO BRAKES IF BRAKES ARE OFF. GPC ENTERS TEMPERATURE MONITORING MODE. FOR CAUSE 5) GPC WILL DROP INTO "IDLE" MODE AND ARM WILL RECEIVE ZEROED JOINT RATE COMMANDS. 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)		OMRSD OFFLINE --- APPLY BRAKE ON/OFF SIGNALS TO INPUT OF MCIU. VERIFY VOLTAGE ON BRAKE BUS AND VERIFY NO BITE BITS ARE SET. OMRSD ONLINE INSTALLATION --- OPERATE BRAKE SWITCH. VERIFY VOLTAGE AT LONGERON INTERFACE AND VERIFY NO BITE ANNUNCIATIONS. OMRSD ONLINE TURNAROUND --- OPERATE BRAKE SWITCH. VERIFY BRAKES RESPOND CORRECTLY AND VERIFY NO BITE BITS ARE SET.

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