CRITICAL ITEMS LIST

PROJECT: SRMS (-5 M[illegible]OSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCIU ASS'Y P/N: 51T55F180-5 SHEET: 1

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY — RATIONALE FOR ACCEPTANCE — SCREENS: N/A
1965	0	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE MC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)	DESIGN FEATURES --- INPUT CIRCUITS, FOR ANALOG VOLTAGES (HAND CONTROLLER SIGNALS AND CALIBRATION VOLTAGES) ARE SIMPLE R-C FILTERS. 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. EEE PARTS HAVE BEEN SELECTED AND CONTROLLED IN ACCORDANCE WITH SPAR-RMS-PA.003. THIS DOCUMENT DEFINES THE PROGRAM REQUIREMENTS FOR MONITORING AND CONTROLLING EEE PARTS. THE REQUIREMENTS INCLUDE PART SELECTION TO AT LEAST "ESTABLISHED RELIABILITY" LEVELS, AND ADEQUATE DERATING OF PART STRESS LEVELS. PROCEDURES AND ACTIVITIES ARE SPECIFIED TO ENSURE AT LEAST EQUIVALENT QUALITY FOR NONSTANDARD AND IRREGULAR PARTS. RELIABILITY ANALYSIS HAS CONFIRMED NO PARTS WITH GENERICALLY HIGH FAILURE RATES. AEROSPACE DESIGN STANDARDS FOR DETAILING ELECTRONIC PARTS PACKAGING, MOUNTING AND STRUCTURAL/MECHANICAL/INTEGRITY OF ASSEMBLIES ARE APPLIED. SUCH DESIGN HAS BEEN REVIEWED AND FOUND SATISFACTORY THROUGH THE DESIGN AUDIT PROCESS, INCLUDING THE USE OF RELIABILITY, MAINTAINABILITY AND SAFETY CHECKLISTS. MATERIAL SELECTION AND USAGE CONFORMS TO SPAR-SG.368 WHICH IS EQUIVALENT TO THE NASA MATERIALS USAGE REQUIREMENTS. WORST CASE ANALYSIS HAS BEEN CONDUCTED TO ENSURE THAT PERFORMANCE CAN BE MET UNDER WORST CASE TEMPERATURE AND AGING EFFECTS. EEE PARTS STRESS ANALYSIS HAS BEEN COMPLETED AND CONFIRMS THAT THE PARTS MEET THE DERATING REQUIREMENTS. PRINTED CIRCUIT BOARD DESIGNS HAVE BEEN REVIEWED TO ENSURE ADEQUATE CIRCUIT PATH WIDTH AND SEPARATION AND TO CONFIRM APPROPRIATE DIMENSIONS OF CIRCUIT SOLDER PADS AND OF COMPONENT HOLE PROVISIONS. PARTS MOUNTING METHODS ARE CONTROLLED IN ACCORDANCE WITH MSFC-STD-136 WHICH DEFINES APPROVED-MOUNTING METHODS, STRESS RELIEF, AND COMPONENT SECURITY. WHERE APPLICABLE, DESIGN DRAWINGS AND DOCUMENTATION GIVE CLEAR IDENTIFICATION OF HANDLING PRECAUTIONS FOR ESD SENSITIVE PARTS. BOARD ASSEMBLY DRAWINGS INCLUDE THE REQUIREMENTS FOR SOLDERING STANDARDS IN ACCORDANCE WITH NHB 5300.4(3) AND JSC 08800. 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. 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.

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: 2

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1965	0	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE HC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)		SCREENS: N/A

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. 2/2 CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: N/A
1965	0	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE MC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)	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: 4

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: N/A
1965	0	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE HC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --------- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --------- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)	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., (MANDATORY 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

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. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: N/A
1965	D	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE HC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (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).

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

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSTALLED) SYSTEM: ELECTRICAL SUBSYSTEM
ASS'Y NOMENCLATURE: MCTU ASS'Y P/N: 51T55FT60-5 SHEET: 6

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: N/A
1965	D	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE HC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)	FAILURE HISTORY --- THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

PREPARED BY: MFWG SUPERCEDING DATE: NONE

DATE: 11 JUL 91 CIL REV: D

CRITICAL ITEMS LIST

PROJECT: SRMS (-5 MCIU INSIALLED) 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. 2/2 CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: N/A
1965	0	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE HC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)	OPERATIONAL EFFECTS --- CORRUPT HAND CONTROLLER DATA. GPC WILL NULL MANUAL COMMANDS AND WILL COME TO REST. POSSIBLE LOSS OF MANUAL COMPUTER SUPPORTED DRIVE MODE. CREW ACTION --- GROUND CAN DETECT WHICH HAND CONTROLER CHANNEL(S) LOST. FOR A SINGLE CHANNEL FAILURE LOST HAND CONTROLLER AXIS CAN BE REASSIGNED THROUGH SPEC 95. FOR MULTIPLE CHANNEL FAILURE, AUTO, SINGLE, DIRECT AND BACKUP DRIVE MODES ARE AVAILABLE. CREW TRAINING --- CREW IS TRAINED: TO ALWAYS OBSERVE WHETHER THE ARM IS RESPONDING PROPERLY TO COMMANDS. IF IT ISN'T, APPLY BRAKES. MISSION CONSTRAINT --- OPERATE UNDER VERNIER RATES WITHIN 10 FT OF STRUCTURE. THE OPERATOR MUST BE ABLE TO DETECT THAT THE ARM/PAYLOAD IS RESPONDING PROPERLY TO COMMANDS VIA WINDOW AND/OR CCTV VIEWS DURING ALL ARM OPERATIONS.

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: 51155FT60-5 SHEET: 8

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1965	0	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE HC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) NULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)	SCREEN FAILURES --- N/A	SCREENS: N/A

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: 9

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: N/A
1965	0	ANALOG INTERFACE. SCHEMATIC 812742	MODE: CORRUPT HAND CONTROLLER SIGNAL CONVERSION CAUSE(S): 1) ONE OR MORE HC CHANNELS OF MULTIPLEXER FAIL	HAND CONTROLLER MISMATCH WILL BE DETECTED. MCIU WILL HARDOVER THE COMMANDS FOR THE FAILED CHANNEL(S). GPC WILL ZERO COMMANDS FOR THE FAILED CHANNEL(S) AND GO INTO IDLE AND POSITION HOLD. WORST CASE --- LOSS OF MANUAL AUGMENTED MODES. REDUNDANT PATHS REMAINING --- 1) HULL COMMAND FROM GPC (FOR SAFING THE SYSTEM) 2) AUTO OR SINGLE DRIVE MODES (FOR CONTINUING OPERATIONS)	OMRSD OFFLINE --- VERIFY THE HAND CONTROLLER OUTPUT RESPONSE TO A KNOWN INPUT VOLTAGE. OMRSD ONLINE INSTALLATION --- NONE OMRSD ONLINE TURNAROUND --- VERIFY THAT THE HAND CONTROLLER INPUTS ARE TRANSMITTED BY THE MCIU

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