CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
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
3680	1	COMMUTATION SCANNER QTY-1 P/N 51140E517	MODE: ERRATIC COMM SCANNER ASSEMBLY OUTPUT. CAUSE(S): (1) FAILURE OF BUS FILTER (2) FAILURE OF SOME EEE PARTS. (3) LOSS OF PLATING ON CODE WHEEL.	DEGRADED MOTOR PERFORMANCE (I.E. REDUCED MOTOR TORQUE). MOTOR MAY CONTINUE TO RUN. IF STOPPED. MOTOR MAY NOT START. ARM WILL STAY LIMP DURING AUTO CAPTURE SEQUENCE. WORST CASE ---------- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING ---------- BACKUP EE RELEASE.	DESIGN FEATURES --------------- THE END EFFECTOR COMMUTATION SCANNER ASSEMBLY (CSA) IS A MAJOR BOUGHT-OUT-PART WHICH IS SUPPLIED BY BEI MOTION SYSTEMS AND MEETS OR EXCEEDS THE REQUIREMENTS OF SPAR-SG.454. 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. ALL EEE PARTS ARE PROCURED TO MILITARY SPECIFICATIONS OR EQUIVALENT. THE CIRCUITS EMBODY THE USE OF NHB5300.4 (3A) SOLDERING, WITH NO PLATED-THRU HOLES (2 WIRES ARE USED WHERE NECESSARY) AND ALL LAP SOLDER JOINTS. THE EMI FILTER IS PURCHASED TO AN SCD (905-15181), WHICH INCORPORATES RESCREENING INCLUDING THERMAL SHOCK, BURN-IN, AND HERMETICITY TESTING, AS WELL AS X-RAY OF ALL UNITS. CERAMIC CAPACITORS ARE USED THROUGHOUT. THE BUS CAPACITORS ARE S LEVEL M39014. THE CURRENT LIMIT RESISTOR (LED 50MA) IS A TWO WATT RATING RWR80S TYPE DEVICE, OPERATING AT A STRESS LEVEL OF LESS THAN 0.1 TO GIVE A VERY LOW PROBABILITY OF FAILURE.

PREPARED BY: MFWG
SUPERCEDING DATE: 11 SEP 86
APPROVED BY: _____
DATE: 24 JUL 91
CIL REV: 1

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PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
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
3680	1	COMMUTATION SCANNER QTY-1 P/N 51140E517	MODE: ERRATIC COMM SCANNER ASSEMBLY OUTPUT. CAUSE(S): (1) FAILURE OF BUS FILTER (2) FAILURE OF SOME EEE PARTS. (3) LOSS OF PLATING ON CODE WHEEL.	DEGRADED MOTOR PERFORMANCE (I.E. REDUCED MOTOR TORQUE). MOTOR MAY CONTINUE TO RUN. IF STOPPED. MOTOR MAY NOT START. ARM WILL STAY LIMP DURING AUTO CAPTURE SEQUENCE. WORST CASE --- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING --- BACKUP EE RELEASE.	CODE WHEELS ARE MANUFACTURED PER BEI PROCEDURE 905A12224. THE BASE METAL WHEEL IS CHROME-PLATED BY AN OUTSIDE VENDOR, AND RETURNED TO BEI. PHOTO-RESIST IS USED TO MASK AREAS WHICH WILL REMAIN BLACK, WHILE AREAS WHICH ARE TO BE REFLECTIVE ARE STRIPPED OF BLACK CHROME TO EXPOSE THE GOLD SURFACE. THIS PROCESS INSURES GOOD ADHESION.

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ASS'Y P/N: 51140E1470
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
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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
3680	1	COMMUTATION SCANNER QTY-1 P/N 51140E517	MODE: ERRATIC COMM SCANNER ASSEMBLY OUTPUT. CAUSE(S): (1) FAILURE OF BUS FILTER (2) FAILURE OF SOME EEE PARTS. (3) LOSS OF PLATING ON CODE WHEEL.	DEGRADED MOTOR PERFORMANCE (I.E. REDUCED MOTOR TORQUE). MOTOR MAY CONTINUE TO RUN. IF STOPPED. MOTOR MAY NOT START. ARM WILL STAY LIMP DURING AUTO CAPTURE SEQUENCE. WORST CASE ---------- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQ. REDUNDANT PATHS REMAINING ---------- BACKUP EE RELEASE.	TEST PERSONNEL, TEST DOCUMENTS, TEST EQUIPMENT CALIBRATION/ VALIDATION STATUS AND HARDWARE CONFIGURATION IS CONVENED BY QUALITY ASSURANCE IN CONJUNCTION WITH ENGINEERING, RELIABILITY, CONFIGURATION CONTROL, SUPPLIER AS APPLICABLE, AND THE GOVENMENT REPRESENTATIVE, PRIOR TO THE START OF ANY FORMAL TESTING (ACCEPTANCE OR QUALIFICATION). ACCEPTANCE TESTING (ATP) INCLUDES, AMBIENT, VIBRATION AND THERMAL-VAC TESTING, (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT) INTEGRATION OF UNIT TO MOTOR MODULE - INSPECTIONS INCLUDE GROUNDING CHECKS, CONNECTOR FOR BENT PINS, VISUAL, CLEANLINESS, INTERCONNECT WIRING ETC. MOTOR MODULES ARE TESTED TO THE REQUIREMENTS OF SPAR-TM.1624 WHICH INCLUDES, CONTINUITY AND ISOLATION CHECKS, STICTION, COMMUTATOR TIMING, AMBIENT AND THERMAL TESTING. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT). INTEGRATION OF MOTOR MODULE TO END EFFECTOR LRU - INSPECTIONS INCLUDE GROUNDING CHECKS, CONNECTORS FOR BENT OR PUSHBACK CONTACTS, INCONNECT WIRING ETC. PRE-ACCEPTANCE TEST INSPECTION, WHICH INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC., (MANDATORY INSPECTION POINT). ACCEPTANCE TESTING (ATP) INCLUDES, AMBIENT, VIBRATION AND THERMAL-VAC TESTING, (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT) 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 BENT OR PUSH BACK CONTACTS ETC. SRMS SYSTEMS TESTING - STRONGBACK AND FLAT FLOOR AMBIENT PERFORMANCE TEST. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)

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ASS'Y P/N: 51140E1470
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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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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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
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