FMEA REF.	REV.	NOMENCLATURE, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
620	0	LIGHT CONTROL UNIT QTY-1 P/N PS 86022 ED 92020 SHEET 6	MODE: LOSS OF CHANNEL A AND B, 115V. CAUSE(S): (1) SHORT CIRCUIT IN INPUT CIRCUITRY OF CHANNEL A OR B.	CIRCUIT BREAKER INTERRUPTED. LOSS OF ORBITER 115V 400 HZ TO SRMS. ALL D&C DISPLAYS LOST (EXCEPT EVENT INDICATORS). IF SHOULDER BRACE HAS NOT BEEN RELEASED WILL BE UNABLE TO DEPLOY. AUDIO ALARM WILL STILL BE OPERATIVE. WORST CASE ---------- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE. REDUNDANT PATHS REMAINING ---------- N/A		DESIGN FEATURES ---------- THE INPUT CIRCUIT TO CHANNELS A AND B IS A FILTER CIRCUIT COMPRISING TWO INDUCTORS AND TWO CAPACITORS. THE DESIGN AND CONSTRUCTION OF THE INDUCTOR ELEMENTS ARE IN ACCORDANCE WITH MIL-T-27. CAPACITORS ARE TYPE M83421/01. 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 PARTS 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-SQ.360 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 AND CAE PD93409. THESE DOCUMENTS REQUIRE 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 REQUIREMENT FOR SOLDERING STANDARDS IN ACCORDANCE WITH NHB 5300.4(3A) AND JSC 08800A.

PREPARED BY: MEWG SUPERCEDING DATE: 11 SEP 86 APPROVED BY: E:

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: D&C PANEL
SYSTEM: D&C SUBSYSTEM
ASS'Y P/N: ST140E391
SHEET: 2

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
620	0	LIGHT CONTROL UNIT QTY-1 P/N PS 86022 ED 92020 SHEET 6	MODE: LOSS OF CHANNEL A AND B, 115V. CAUSE(S): (1) SHORT CIRCUIT IN INPUT CIRCUITRY OF CHANNEL A OR B.	CIRCUIT BREAKER INTERRUPTED. LOSS OF ORBITER 115V 400 HZ TO SRMS. ALL D&C DISPLAYS LOST (EXCEPT EVENT INDICATORS). IF SHOULDER BRACE HAS NOT BEEN RELEASED WILL BE UNABLE TO DEPLOY. AUDIO ALARM WILL STILL BE OPERATIVE. WORST CASE --- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE. REDUNDANT PATHS REMAINING --- N/A		ACCEPTANCE TESTS --- THE HARDWARE ITEM IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTS AS PART OF THE D&C PANEL ASSEMBLY. O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 1 O THERMAL: +110 DEGREES F TO PLUS 10 DEGREES F (2 CYCLES - 9.5 HRS/CYCLE.) THE D&C PANEL ASSEMBLY IS FURTHER TESTED AS PART OF THE RMS SYSTEM TESTS (TP518 RMS STRONGBACK TEST AND TP552 FLAT FLOOR TEST) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE. QUALIFICATION TESTS --- THE SWITCH ITEM HAS BEEN QUALIFIED FOR ORBITER USE. THE D&C PANEL ASSEMBLY HAS BEEN SUBJECTED TO THE FOLLOWING QUALIFICATION TEST ENVIRONMENTS. O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 1 O SHOCK: 20G/11 MS - 3 AXES (6 DIRECTIONS) O THERMAL: 130 DEGREES F TO -23 DEGREES F (12 HRS PER CYCLE) (6 CYCLES) O HUMIDITY: 95% (120 DEGREES F TO 82 DEGREES F CYCLE IN 16 HRS) 10 CYCLES TOTAL. O EMC: MIL-STD-461 AS MODIFIED BY SL-E-0002 (TEST CE01, CE02, CE03, CS01 (DC/AC), CE03, CS01 (DC/AC), CS02, CS06, RE02 (B/W), RS02, RS03, RS04) FLIGHT CHECKOUT --- PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987

PREPARED BY: MFWG
SUPERCEDING DATE: 11 SEP 86
APPROVED B

DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: D&C PANEL
SYSTEM: D&C SUBSYSTEM
ASS'Y P/N: 51T40E391
SHEET: 3

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
620	0	LIGHT CONTROL UNIT QTY-1 P/N PS 86022 ED 92020 SHEET 6	MODE: LOSS OF CHANNEL A AND B, 115V. CAUSE(S): (1) SHORT CIRCUIT IN INPUT CIRCUITRY OF CHANNEL A OR B.	CIRCUIT BREAKER INTERRUPTED. LOSS OF ORBITER 115V 400 HZ TO SRMS. ALL D&C DISPLAYS LOST (EXCEPT EVENT INDICATORS). IF SHOULDER BRACE HAS NOT BEEN RELEASED WILL BE UNABLE TO DEPLOY. AUDIO ALARM WILL STILL BE OPERATIVE. WORST CASE ---------- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE. REDUNDANT PATHS REMAINING ---------- N/A		QA/INSPECTIONS: ---------- THE LIGHTING CONTROL UNITS ARE PROCURED TO CAE SPECIFICATION PS 86022. THIS SPECIFICATION ESTABLISHES THE PERFORMANCE, DESIGN, DEVELOPMENT, AND VERIFICATION REQUIREMENTS FOR THE LRU. THE UNIT WAS ACCEPTANCE TESTED AND INSPECTED PRIOR TO QUALIFICATION. QUALIFICATION AND ACCEPTANCE OF THE UNIT WAS PERFORMED AS REQUIRED BY SPECIFICATION PS86022 WHICH INCLUDES ACCPETANCE TEST, POWER TEST, EMC, THERMAL CYCLE, VIBRATION QAVT, ACCELERATION, THERMAL/LOW PRESSURE, LIFE PACKAGE QUALIFICATION TEST, LIGHTING, SHOCK AND ACCEPTANCE 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. RECEIVING INSPECTION VERIFIES THAT THE HARDWARE RECEIVED IS AS IDENTIFIED IN THE PROCUREMENT DOCUMENTS, THAT NO DAMAGE HAS OCCURRED DURING SHIPMENT, AND THAT APPROPRIATE DATA HAS BEEN RECEIVED WHICH PROVIDES ADEQUATE TRACEABILITY INFORMATION AND IDENTIFIES ACCEPTABLE PARTS. UNITS ARE INSPECTED THROUGHOUT MANUFACTURE, ASSEMBLY AND TEST IN A MANNER AND UNDER CONDITIONS WHICH SIMULATE END-USE WITHOUT DAMAGE TO THE UNIT. COMPONENT MOUNTING TO FRONT PANEL INSPECTION, SOLDERING OF WIRES TO SWITCH CONTACTS, WIRE ROUTING, STRESS RELIEF OF WIRES ETC., OPERATORS AND INSPECTORS ARE TRAINED AND CERTIFIED TO NASA NHB 5300.4(3A) STANDARD, AS MODIFIED BY JSC08800A. PRE-TEST INSPECTION OF D&C PANEL ASSY INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILD CONFIGURATION VERIFICATION TO AS DESIGN ETC. (SPAR/GOVERNMENT REP. - 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 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 PERFORMANCE, THERMAL AND VIBRATION TESTING, (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT). INTEGRATION OF D&C PANEL, RHC, THC AND MCIU, INSPECTIONS ARE PERFORMED AT EACH STAGE OF INTEGRATION, WHICH INCLUDES GROUNDING CHECKS, INTER CONNECT CABLE VERIFICATION, CONNECTOR

PREPARED BY: MFWG SUPERCEDING DATE: 11 SEP 86 APPROVED BY: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: D&C PANEL
SYSTEM: D&C SUBSYSTEM
ASS'Y P/N: 51T40E391
SHEET: 4

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
620	D	LIGHT CONTROL UNIT QTY-1 P/N PS 86022 ED 92020 SHEET 6	MODE: LOSS OF CHANNEL A AND B, 115V. CAUSE(S): (1) SHORT CIRCUIT IN INPUT CIRCUITRY OF CHANNEL A OR B.	CIRCUIT BREAKER INTERRUPTED. LOSS OF ORBITER 115V 400 HZ TO SRMS. ALL D&C DISPLAYS LOST (EXCEPT EVENT INDICATORS). IF SHOULDER BRACE HAS NOT BEEN RELEASED WILL BE UNABLE TO DEPLOY. AUDIO ALARM WILL STILL BE OPERATIVE. WORST CASE ..... LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE. REDUNDANT PATHS REMAINING ..... N/A		INSPECTION FOR BENT OR PUSHBACK CONTACTS ETC. SUB-SYSTEM PERFORMANCE TESTING (ATP), INCLUDES AN AMBIENT PERFORMANCE TEST. (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)

PREPARED BY: MFWG
SUPERCEDING DATE: 11 SEP 86
APPROVED BY:
DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: D&C PANEL
SYSTEM: D&C SUBSYSTEM
ASS'Y P/N: 51T60E391
SHEET: 5

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
620	D	LIGHT CONTROL UNIT QTY-1 P/N PS 86022 ED 92020 SHEET 6	MODE: LOSS OF CHANNEL A AND B, 115V. CAUSE(S): (1) SHORT, CIRCUIT IN INPUT CIRCUITRY OF CHANNEL A OR B.	CIRCUIT BREAKER INTERRUPTED. LOSS OF ORBITER 115V 400 HZ TO SRMS. ALL D&C DISPLAYS LOST (EXCEPT EVENT INDICATORS). IF SHOULDER BRACE HAS NOT BEEN RELEASED WILL BE UNABLE TO DEPLOY. AUDIO ALARM WILL STILL BE OPERATIVE. WORST CASE --- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE. REDUNDANT PATHS REMAINING --- N/A		FAILURE HISTORY --- THE FOLLOWING FAILURE ANALYSIS REPORT(S) ARE RELEVANT: FAR 4005:

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SUPERCEDING DATE: 11 SEP 86
APPROVED BY:
DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: D&C PANEL
SYSTEM: D&C SUBSYSTEM
ASS'Y P/N: 51T40E391
SHEET: 6

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
620	D	LIGHT CONTROL UNIT QTY-1 P/N PS 86022 ED 92020 SHEET 6	MODE: LOSS OF CHANNEL A AND B, 115V. CAUSE(S): (1) SHORT CIRCUIT IN INPUT CIRCUITRY OF CHANNEL A OR B.	CIRCUIT BREAKER INTERRUPTED. LOSS OF ORBITER 115V 400 HZ TO SRMS. ALL D&C DISPLAYS LOST (EXCEPT EVENT INDICATORS). IF SHOULDER BRACE HAS NOT BEEN RELEASED WILL BE UNABLE TO DEPLOY. AUDIO ALARM WILL STILL BE OPERATIVE. WORST CASE LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE. REDUNDANT PATHS REMAINING N/A		OPERATIONAL EFFECTS CANNOT RELEASE SHOULDER BRACE. CANNOT UNCRADLE ARM TO PERFORM MISSION. CREW ACTION USE EVA OR RMS D&C IFM KIT TO RELEASE SHOULDER BRACE. CREW TRAINING NONE MISSION CONSTRAINTS RELEASE THE BRACE AS EARLY IN THE MISSION AS POSSIBLE TO AVOID ANY THERMALLY INDUCED FAILURES TO RELEASE. SCREEN FAILURES N/A OMRSD OFFLINE SELECT PARAMETER SWITCH TO TEST. VERIFY CAUTION AND WARNINGS LIT. OMRSD ONLINE INSTALLATION NONE OMRSD ONLINE TURNAROUND SELECT PARAMETER SWITCH TO TEST. VERIFY CAUTION AND WARNINGS LIT.

PREPARED BY: MFMG
SUPERCEDING DATE: 11 SEP 86
APPROVED BY: