

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
ASS'Y NOMENCLATURE: D&C PANEL

SYSTEM: D&C SUBSYSTEM  
ASS'Y P/N: 311204101

SHEET: 1

ITEM REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RDR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1380	0	POWER SUPPLY 115V A/C QTY: 1 REFERENCE SCHEMATIC ICD 3 001B-03 (SHOULDER POWER). PS 90120. WL 90120. ED 85511	MODE: LOSS OF 115V A/C POWER.  CAUSE(S): (1) INPUT FILTER SHORT.  (2) 115V WIRE HARNESS SHORT.  (3) ANY 115V SWITCH CONTACT SHORT TO CASE (LIGHTING, SHOULDER BRACE).	EDGE LIT LIGHTING, CAB, NRU AND MODES SELECT ANNUNCIATORS LOST. SYSTEM WILL OPERATE IF BRACE RELEASED.  WORST CASE ----- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE.  REDUNDANT PATHS REMAINING ----- N/A	DESIGN FEATURES -----	<p>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 M03621/01.</p> <p>INTERCONNECTIONS BETWEEN THE D&amp;C INTERFACE CONNECTORS AND ALL MODULE PRINTED BOARD CONNECTORS IS ACHIEVED BY MEANS OF FILM WIRING. THIS IS SIMILAR TO A FLEXIBLE PRINTED CIRCUIT AND HAS KAPTON INSULATION. THE FILM WIRING PACKAGE IS MANUFACTURED BY HUGHES AIRCRAFT. THE LOWER HALF OF THE ELECTRONICS PACKAGE, THE ELECTRONICS TRAY, AND ALL PCB SOCKET CONNECTORS ARE SUPPLIED AS A KIT. THE FILM WIRING IS INTEGRATED TO THE KIT BY HUGHES. AN ASSEMBLY WAS SUBJECTED TO QUALIFICATION LEVEL VIBRATION AND THERMAL CYCLING TESTS. ALL DELIVERED ASSEMBLIES ARE SUBJECTED TO ACCEPTANCE TESTING WHICH INCLUDES: AVT AND ALL WITH CONTINUOUS AUTOMATIC CONTINUITY. SCAN OF ALL CONTACTS, INSULATION RESISTANCE, AND DIELECTRIC STRENGTH.</p> <p>INTERCONNECTIONS BETWEEN THE ELECTRONICS PACKAGE AND THE PANEL MOUNTED PARTS AND COMPONENTS IS ACHIEVED BY A PRE-FORMED WIRING HARNESS. PRIOR TO INSTALLATION THIS HARNESS IS SUBJECTED TO TESTING FOR DIELECTRIC STRENGTH (1250 VAC), INSULATION RESISTANCE (500 VDC), AND CONTINUITY.</p> <p>THE TEST PROGRAM FOR THE D&amp;C INCLUDES FUNCTIONAL TESTING OF THE FULLY ASSEMBLED ELECTRONICS PACKAGE AND ACCEPTANCE TESTING OF THE D&amp;C PANEL ASSEMBLY.</p> <p>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 SG.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.</p> <p>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 HOLES/PROVISIONS.</p> <p>PARTS MOUNTING WITHIN THE ASSEMBLY IS CONTROLLED IN ACCORDANCE WITH</p>

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PROJECT: SRMS  
 ASS'Y NOMENCLATURE: D&C PANEL

SYSTEM: D&C SUBSYSTEM  
 ASS'Y P/N: 51140E301

SHEET: 2

P/N REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	ROW / FUNC. 2/2	CRITICALITY RATIONALE FOR ACCEPTANCE
1380	0	POWER SUPPLY 115V A/C QTY-1 REFERENCE SCHEMATIC ICD 3-0018-03 (ORBITER POWER). PS 90128. WL 90128. ED 85511	MODE: LOSS OF 115V A/C POWER.  CAUSE(S): (1) INPUT FILTER SHORT.  (2) 115V WIRE HARNESS SHORT.  (3) ANY 115V SWITCH CONTACT SHORT TO CASE (LIGHTING, SHOULDER BRACE).	EDGE LIT LIGHTING, CAB, NRU AND MODES SELECT ANNUNCIATORS LOST. SYSTEM WILL OPERATE IF BRACE RELEASED.  WORST CASE ----- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE.  REDUNDANT PATHS REMAINING ----- N/A		MSFC-STD-136 AND CAE PD93489. 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: MHWG

SUPRECEDING DATE: 11 SEP 86

APF

DATE:

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
ASS'Y NOMENCLATURE: D&C PANEL

SYSTEM: D&C SUBSYSTEM  
ASS'Y P/N: 31140E391

SHEET: 3

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1380	0	POWER SUPPLY 115V A/C QTY-1 REFERENCE SCHEMATIC 1C0 3-0018-03 (ORBITER POWER). PS 90120. WL 90120. ED 85511	MODE: LOSS OF 115V A/C POWER:  CAUSE(S): (1) INPUT FILTER SHORT.  (2) 115V WIRE HARNESS SHORT.  (3) ANY 115V SWITCH CONTACT SHORT TO CASE (LIGHTING, SHOULDER BRACE).	EDGE LIT LIGHTING, C&W, NRU AND MODES SELECT ANNUNCIATORS LOST. SYSTEM WILL OPERATE IF BRACE RELEASED.  WORST CASE ----- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE.  REDUNDANT PATHS REMAINING  N/A		<p>ACCEPTANCE TESTS</p> <p>-----</p> <p>THE HARDWARE ITEM IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTING AS PART OF THE D&amp;C PANEL.</p> <p>0 VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 1</p> <p>0 THERMAL: +100 DEGREES F TO +10 DEGREES F 2 CYCLES (9.5 HRS PER CYCLE)</p> <p>THE D&amp;C PANEL ASSEMBLY IS FURTHER TESTED AS PART OF THE RMS SYSTEM (TP51B RMS STRONGBACK TEST AND TP552 FLAT FLOOR TEST) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE.</p> <p>QUALIFICATION TESTS</p> <p>-----</p> <p>THE D&amp;C PANEL HAS BEEN SUBJECTED TO THE FOLLOWING QUALIFICATION TEST ENVIRONMENT:</p> <p>0 VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 1</p> <p>0 SHOCK: 20G/11MS - 3 AXES (6 DIRECTION)</p> <p>0 THERMAL: 130 DEGREES F TO -23 DEGREES F (12 HRS PER CYCLE) (6 CYCLES)</p> <p>0 HUMIDITY: 95% (120 DEGREES F TO 82 DEGREES F CYCLE IN 16 HRS) 10 CYCLES TOTAL</p> <p>0 EMC: MIL-STD-461 AS MODIFIED BY SL E-0002 (TEST CE01, CE, CE03, CS01(DC/AC), CS02, CS06, RE02 (B/W), RS02, RS03, RS04) RE02 (B/W) RS02, 03, 04)</p> <p>FLIGHT CHECKOUT</p> <p>-----</p> <p>PORS OPS CHECKLIST (ALL VEHICLES) JSC 16987</p>

PREPARED BY: MIMG

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: 5174DE391

SHEET: 4

THEA REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1300	0	POWER SUPPLY 115V A/C QTY-1 REFERENCE SCHEMATIC ICD 3-0018-03 (ORBITER POWER). PS 90120. WL 90120. ED 85511	<p>MODE: LOSS OF 115V A/C POWER.</p> <p>CAUSE(S): (1) INPUT FILTER SHORT. (2) 115V WIRE HARNESS SHORT. (3) ANY 115V SWITCH CONTACT SHORT TO CASE (LIGHTING, SHOULDER BRACE).</p>	<p>EDGE LIT LIGHTING, C&amp;W, MRU AND MODES SELECT ANNUNCIATORS LOST. SYSTEM WILL OPERATE IF BRACE RELEASED.</p> <p>WORST CASE ----- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>	<p>QA/INSPECTIONS -----</p>	<p>THE LIGHTING CONTROL UNITS ARE PROCURED TO COMPLY WITH SPECIFICATION PS 06022. 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 PS06022 WHICH INCLUDES ACCEPTANCE TEST, POWER TEST, EMC, THERMAL CYCLE, VIBRATION QAVT, ACCELERATION, THERMAL/LOW PRESSURE, LIFE PACKAGE QUALIFICATION TEST, LIGHTING, SHOCK AND ACCEPTANCE 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 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.</p> <p>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.</p> <p>UNITS ARE INSPECTED THROUGHOUT MANUFACTURE, ASSEMBLY AND TEST IN A MANNER AND UNDER CONDITIONS WHICH SIMULATE END-USE WITHOUT DAMAGE TO THE UNIT.</p> <p>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.</p> <p>PRE-TEST INSPECTION OF D&amp;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)</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 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).</p> <p>ACCEPTANCE TESTING (ATP) INCLUDES AMBIENT PERFORMANCE, THERMAL AND VIBRATION TESTING, (SPAR/GOVERNMENT REP. MANDATORY INSPECTION POINT).</p> <p>INTEGRATION OF D&amp;C PANEL, RHC, THC AND MCIU, INSPECTIONS ARE PERFORMED AT EACH STAGE OF INTEGRATION, WHICH INCLUDES GROUNDING CHECKS, INTER CONNECT CABLE VERIFICATION, CONNECTOR</p>

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
ASS'Y NOMENCLATURE: DAC PANEL

SYSTEM: DAC SUBSYSTEM  
ASS'Y P/N: 51140E391

SHEET: 5

ITEM REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HOUR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1380	0	POWER SUPPLY 115V A/C QTY-1 REFERENCE SCHEMATIC ICD 3-0018-03 (ORBITER POWER), PS 90120, WL 90120, ED 85511	<p>MODE: LOSS OF 115V A/C POWER.</p> <p>CAUSE(S): (1) INPUT FILTER SHORT.</p> <p>(2) 115V WIRE HARNESS SHORT.</p> <p>(3) ANY 115V SWITCH CONTACT SHORT TO CASE (LIGHTING, SHOULDER BRACE).</p>	<p>EDGE LIT LIGHTING, CBW, NRJ AND MODES SELECT ANNUNCIATORS LOST. SYSTEM WILL OPERATE IF BRACE RELEASED.</p> <p>WORST CASE ----- LOSS OF MISSION. LOSS OF SHOULDER BRACE-RELEASE.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>		<p>INSPECTION FOR BENT OR PUSHBACK CONTACTS ETC.</p> <p>SUB-SYSTEM PERFORMANCE TESTING (ATP), INCLUDES AN AMBIENT PERFORMANCE TEST. (MANDATORY INSPECTION POINT).</p> <p>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.</p> <p>SRMS SYSTEMS TESTING - STRONGBACK AND FLAT FLOOR AMBIENT PERFORMANCE TEST. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)</p>

PREPARED BY: HLWG

SUPERSEDING 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: 51140E301

SHEET: 6

INEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1380	0	POWER SUPPLY 115V A/C QTY-1 REFERENCE SCHEMATIC ICD 3-0018-03 (ORBITER POWER). PS 90120. WL 90120. ED 05511	<p>MODE: LOSS OF 115V A/C POWER.</p> <p>CAUSE(S): (1) INPUT FILTER SHORT. (2) 115V WIRE HARNESS SHORT. (3) ANY 115V SWITCH CONTACT SHORT TO CASE (LIGHTING, SHOULDER BRACE).</p>	<p>EDGE LIT LIGHTING, CAB, MRU AND MODES SELECT ANNUNCIATORS LOST. SYSTEM WILL OPERATE IF BRACE RELEASED.</p> <p>WORST CASE ----- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>		<p>FAILURE HISTORY -----</p> <p>THE FOLLOWING FAILURE ANALYSIS REPORT(S) ARE RELEVANT:</p> <p>FAR 4016: S/N 117902 JUL 80</p> <p>DESCRIPTION ----- LIGHTS FLICKERED DURING X AXIS VIB, FOUND TRANSISTOR MOUNTING SCREWS TOO CLOSE TO COVER.</p> <p>CORRECTIVE ACTION ----- ECM 5076 CORRECTED DESIGN ERROR</p>

PREPARED BY: NIMG

SUPERSEDING DATE: 11 SEP 86

APPROVAL

ATE: \_\_\_\_\_

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: D&C PANEL

SYSTEM: D&C SUBSYSTEM  
 ASS'Y P/N: 51140E391

SHEET: 7

FMEA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOWR / FUNC. 2/2 CRITICALITY	RATIONALE FOR ACCEPTANCE
1380	1	POWER SUPPLY 115V A/C QTY-1 REFERENCE SCHEMATIC ICD 3-0010-03 (ORBITER POWER). PS 90120. WL 90120. ED 85511	MODE: LOSS OF 115V A/C POWER.  CAUSE(S): (1) INPUT FILTER SHORT.  (2) 115V WIRE HARNESS SHORT.  (3) ANY 115V SWITCH CONTACT SHORT TO CASE (LIGHTING, SHOULDER BRACE).	EDGE LIT LIGHTING, CBM, MRU AND MODES SELECT ANNUNCIATORS LOST. SYSTEM WILL OPERATE IF BRACE RELEASED.  WORST CASE ----- LOSS OF MISSION. LOSS OF SHOULDER BRACE RELEASE.  REDUNDANT PATHS REMAINING ----- N/A	2/2	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 115V POWER DRAW.  OMRSD ONLINE INSTALLATION ----- NONE  OMRSD ONLINE TURNAROUND ----- SELECT PARAMETER SWITCH TO TEST. VERIFY EDGE LIGHTING.

PREPARED BY: MFG

SUPERSEDING DATE: 06 OCT 97

APPRO

DATE: