

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: ROTATIONAL HAND CONTROLLER

SYSTEM: D&C CONTROLS SUBSYSTEM  
 ASS'Y P/N: 511552117 SHEET: 1

YREA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	ROUN / FUNC. 1/1 CRITICALITY	NATIONALE FOR ACCEPTANCE
1530	6 -	CAPTURE/RELEASE SWITCH Q1Y-1 P/N MS 27717-27	<p>MODE: LOSS OF MANUAL CAPTURE AND RELEASE (12.4/8.2)</p> <p>CAUSE(S): (1) POLE FAILS TO OFF POSITION. (2) POLE FAILS TO CAPT POSITION. (3) POLE FAILS TO RELEASE POSITION. (4) CAPTURE CONTACT FAILS S/C. (5) RELEASE CONTACT FAILS S/C.</p>	<p>CAUSE (1) NO MANUAL CAPT/RELEASE CAPABILITY. FOR CAPT. ARM WILL LIMP UNTIL CND. REMOVED.</p> <p>CAUSE (2) WHEN MANUAL SELECTED, EE SHARES WILL CLOSE. . . MOTOR WILL STALL.</p> <p>CAUSE (3) WHEN MANUAL SELECTED, PAYLOAD WILL BE RELEASED.</p> <p>CAUSE (4) WHEN MANUAL SELECTED SHARES WILL CLOSE. WHEN RELEASE SELECTED, RELEASE WILL OPERATE CORRECTLY. WHEN RELEASE COMMAND REMOVE, SHARES WILL RECLOSE.</p> <p>CAUSE (5) WHEN MANUAL SELECTED, P/L WILL BE RELEASED IN RIGID POSITION. MOTOR WILL STALL.</p> <p>WORST CASE UNCOMMANDED RELEASE. UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING ..... N/A</p>	<p>DESIGN FEATURES .....</p> <p>THE CAPTURE/RELEASE SWITCH IS A TOGGLE - ACTUATED SWITCH, TYPE MS27717-27, QUALIFIED TO MIL-C-83739.</p> <p>REPRESENTATIVE SWITCHES AND ACTUATORS WERE LIFE TESTED FOR SRMS USE.</p> <p>THIS TEST WAS CONDUCTED BY MOUNTING THE SWITCHES IN A REPRESENTATIVE HAND GRIP FRAME. TESTING INCLUDED - RANDOM VIBRATION TO QVT LEVELS AND OPERATING LIFE TESTS TO 10000 CYCLES (5000 BEFORE VIBRATION, AND 5000 POST-VIBRATION) CONTACT RESISTANCE, AND ACTUATOR OPERATING FORCES. FOR SWITCH OPERATIONAL CYCLES REFER TO TABLE 13.</p> <p>SOLDERED CONNECTIONS TO THE SWITCHES ARE POTTED TO AFFORD STRAIN RELIEF, AND PROTECTION AGAINST SHORT CIRCUIT.</p> <p>THE PROCUREMENT SPECIFICATION FOR THE SWITCH INCLUDES THE REQUIREMENT FOR DPA ON SAMPLES FROM EACH DELIVERED LOT.</p>	

PREPARED BY: MEMG

SUPERSEDING DATE: 01 OCT 86

APPROVED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: ROTATIONAL HAND CONTROLLER

SYSTEM: D&C CONTROLS SUBSYSTEM  
 ASS'Y P/N: 51155E117

SHEET: 2

TMA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	ROW	/ FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
1530	6	CAPTURE/ RELEASE SWITCH QTY-1 P/N MS 27717-27	<p>MODE: LOSS OF MANUAL CAPTURE AND RELEASE (12.4/6.2)</p> <p>CAUSE(S):                      (1) POLE FAILS TO OFF POSITION.                      (2) POLE FAILS TO CAPT POSITION.                      (3) POLE FAILS TO RELEASE POSITION.                      (4) CAPTURE CONTACT FAILS S/C.                      (5) RELEASE CONTACT FAILS S/C.</p>	<p>CAUSE (1)                      NO MANUAL CAPT/ RELEASE CAPABILITY. FOR CAPT. ARM WILL LIMP UNTIL CHD. REMOVED.</p> <p>CAUSE (2)                      WHEN MANUAL SELECTED, EE SNARES WILL CLOSE. MOTOR WILL STALL.</p> <p>CAUSE (3)                      WHEN MANUAL SELECTED, PAYLOAD WILL BE RELEASED.</p> <p>CAUSE (4)                      WHEN MANUAL SELECTED SNARES WILL CLOSE. WHEN RELEASE SELECTED, RELEASE WILL OPERATE CORRECTLY. WHEN RELEASE COMMAND REMOVE, SNARES WILL RECLOSE.</p> <p>CAUSE (5)                      WHEN MANUAL SELECTED, P/L WILL BE RELEASED IN RIGID POSITION. MOTOR WILL STALL.</p> <p>WORST CASE                      UNCOMMANDED RELEASE. UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING                      N/A</p>			<p>ACCEPTANCE TESTS</p> <p>THE RHC IS SUBJECTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTAL TESTING AS AN SRU.</p> <p>0 VIBRATION: LEVEL AND DURATION REFERENCE TABLE 1</p> <p>0 THERMAL: +120 DEGREES F TO 20 DEGREES F (12 HRS PER CYCLE) 2 CYCLES TOTAL.</p> <p>THE RHC IS TESTED AS PART OF THE D&amp;C SUBSYSTEM; WHICH CONSIST OF D&amp;C PANEL, TMC AND RHC; PER 1P 347.</p> <p>THE TOTAL D&amp;C SUBSYSTEM UNDERGOES RMS SYSTEM TESTING, (TP 518 RMS STRONGBACK, AND TP552 FLAT FLOOR TESTS) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE.</p> <p>QUALIFICATIONS TESTS</p> <p>THE RHC IS CERTIFIED BY SIMILARITY TO THE ORBITER USED RHC EXCEPT FOR FINGER OPERATED SWITCHES. THE BASIC DIFFERENCES IS THAT THE ORBITER RHC IS TRIPLE REDUNDANT AND THE RMS RHC IS SINGLE STRING.</p> <p>FLIGHT CHECKOUT</p> <p>PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987</p>

PREPARED BY: RFWG

SUPERSEDING DATE: 03 OCT 86

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DATE:

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: ROTATIONAL HAND CONTROLLER

SYSTEM: D&C CONTROLS SUBSYSTEM  
 ASS'Y P/N: 5155E117

SHEET: 3

FMCA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMN / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
1538	6	CAPTURE/RELEASE SWITCH QTY-1 P/N NS 27717-27	<p>MODE: LDSS OF MANUAL CAPTURE AND RELEASE (12.4/6.2)</p> <p>CAUSE(S):                      (1) POLE FAILS TO OFF POSITION.                      (2) POLE FAILS TO CAPT POSITION.                      (3) POLE FAILS TO RELEASE POSITION.                      (4) CAPTURE CONTACT FAILS S/C.                      (5) RELEASE CONTACT FAILS S/C.</p>	<p>CAUSE (1)                      NO MANUAL CAPT/RELEASE CAPABILITY. FOR CAPT. ARM WILL LIMP UNTIL CMD. REMOVED.</p> <p>CAUSE (2)                      WHEN MANUAL SELECTED EE SHARES WILL CLOSE. MOTOR WILL STALL.</p> <p>CAUSE (3)                      WHEN MANUAL SELECTED, PAYLOAD WILL BE RELEASED.</p> <p>CAUSE (4)                      WHEN MANUAL SELECTED SHARES WILL CLOSE. WHEN RELEASE SELECTED RELEASE WILL OPERATE CORRECTLY. WHEN RELEASE COMMAND REMOVE, SHARES WILL RECLOSE.</p> <p>CAUSE (5)                      WHEN MANUAL SELECTED, P/L WILL BE RELEASED IN RIGID POSITION. MOTOR WILL STALL.</p> <p>WORST CASE                      UNCOMMANDED RELEASE.                      UNANNUNCIATED CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING                      -----                      N/A</p>	1/1	<p>QA/INSPECTIONS</p> <p>TOGGLE SWITCHES ARE PROCURED TO NS27717 AS REQUIRED BY HONEYWELL DRAWING NO. 10067199. SWITCHES ARE QUALIFIED AND SCREENED TO THE REQUIREMENTS OF MIL-S-83731 AND DRAWING NO. 10067199. QUALIFICATION TESTING OF SWITCHES WAS PERFORMED TO THE REQUIREMENTS OF HONEYWELL TEST PROCEDURE NO. SW-QTP-01. THE SWITCH MECHANISMS AND SWITCHES SUCCESSFULLY COMPLETED 10,000 CYCLES OF LIFE CYCLING. IN ADDITION TO THE 10,000 LIFE CYCLES, THE SWITCH MECHANISMS AND SWITCHES WERE SUBJECTED TO THE QAVT AND FLIGHT VIBRATION REQUIREMENTS OF CAE SPECIFICATION PS 87027.51. PRIOR TO ANY SWITCH CYCLING OR VIBRATION, SWITCH MECHANISM SUB ASSEMBLIES WERE GIVEN A FUNCTIONAL PERFORMANCE TEST ON THE SSCC TEST CONSOLE. DETAILED TEST RESULTS ARE COVERED IN HONEYWELL TEST REPORT NO. AEN-77-059. NASA APPROVAL OF SWITCHES IS UNDER NSPAR 4092 AND NSPAR 4093.</p> <p>WIRE IS PROCURED TO SPECIFICATION MIL-W-22759 OR MIL-W-81381 AND INSPECTED AND TESTED TO NASA JSCM8080 STANDARD NUMBER 95A.</p> <p>RECEIVING INSPECTION VERIFIES THAT SWITCHES RECEIVED ARE AS IDENTIFIED IN THE PROCUREMENT DOCUMENTS, THAT NO PHYSICAL DAMAGE HAS OCCURRED TO SWITCHES DURING SHIPMENT, THAT THE RECEIVING DOCUMENTS PROVIDE ADEQUATE TRACEABILITY INFORMATION AND ACCEPTANCE TEST DATA IDENTIFIES ACCEPTABLE PARTS.</p> <p>PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE,</p> <p>COMPONENT MOUNTING INSPECTION FOR CORRECT SOLDERING, WIRE LOOPING, STRAPPING, ETC. OPERATORS AND INSPECTORS ARE TRAINED AND CERTIFIED TO NASA NHB 5300.4(3A) STANDARD, AS MODIFIED BY JSC 08800A.</p> <p>PRE-CLOSURE INSPECTION, WORKMANSHIP AND CLEANLINESS (CAE/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, VIBRATION AND THERMAL TESTING (CAE/GOVERNMENT REP. MANDATORY INSPECTION POINT)</p> <p>INTEGRATION OF D&amp;C PANEL, RHC, TNC AND MCIU, INSPECTIONS ARE PERFORMED AT EACH STAGE OF INTEGRATION, WHICH INCLUDES GROUNDING CHECKS, INTER CONNECT CABLE VERIFICATION, CONNECTOR INSPECTION FOR BENT OR PUSHBACK CONTACTS ETC.</p>

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: ROTATIONAL HAND CONTROLLER

SYSTEM: D&C CONTROLS SUBSYSTEM  
 ASS'Y P/N: 51155E117

SHEET: 4

YMEA REF.	REV.	PART, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOLN / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
1530	6	CAPTURE/RELEASE SWITCH QTY-1 P/N NS 27717-27	MODE: LOSS OF MANUAL CAPTURE AND RELEASE (12.4/8.2)  CAUSE(S): (1) POLE FAILS TO OFF POSITION.  (2) POLE FAILS TO CAPT POSITION.  (3) POLE FAILS TO RELEASE POSITION.  (4) CAPTURE CONTACT FAILS S/C.  (5) RELEASE CONTACT FAILS S/C.	CAUSE (1) NO MANUAL CAPT/RELEASE CAPABILITY. FOR CAPT. ARM WILL LIMP UNTIL CMD. REMOVED.  CAUSE (2) WHEN MANUAL SELECTED, EE SHARES WILL CLOSE. MOTOR WILL STALL.  CAUSE (3) WHEN MANUAL SELECTED, PAYLOAD WILL BE RELEASED.  CAUSE (4) WHEN MANUAL SELECTED SHARES WILL CLOSE. WHEN RELEASE SELECTED, RELEASE WILL OPERATE CORRECTLY. WHEN RELEASE COMMAND REMOVE, SHARES WILL RECLOSE.  CAUSE (5) WHEN MANUAL SELECTED, P/L WILL BE RELEASED IN RIGID POSITION. MOTOR WILL STALL.  WORST CASE UNCOMMANDED RELEASE. UNANNUNCIATED CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING N/A		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: MFHG

SUPERCEDING DATE: 03 OCT 86

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RMS/D&C - 392

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**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: ROTATIONAL HAND CONTROLLER

SYSTEM: D&C CONTROLS SUBSYSTEM  
 ASS'Y P/N: 51152117

SHEET: 5

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	DOWN / FUNC. 1/1 CRITICALITY RATIONALE FOR ACCEPTANCE
1530	6	CAPTURE/RELEASE SWITCH QTY-1 P/N MS 27717-27	MODE: LOSS OF MANUAL CAPTURE AND RELEASE (12.4/6.2)  CAUSE(S): (1) POLE FAILS TO OFF POSITION.  (2) POLE FAILS TO CAPT POSITION.  (3) POLE FAILS TO RELEASE POSITION.  (4) CAPTURE CONTACT FAILS S/C.  (5) RELEASE CONTACT FAILS S/C.	CAUSE (1) NO MANUAL CAPT/RELEASE CAPABILITY. FOR CAPT. ARM WILL LIMP UNTIL CMD. REMOVED.  CAUSE (2) WHEN MANUAL SELECTED EE SNARES WILL CLOSE. MOTOR WILL STALL.  CAUSE (3) WHEN MANUAL SELECTED, PAYLOAD WILL BE RELEASED.  CAUSE (4) WHEN MANUAL SELECTED SNARES WILL CLOSE. WHEN RELEASE SELECTED, RELEASE WILL OPERATE CORRECTLY. WHEN RELEASE COMMAND REMOVE, SNARES WILL RECLOSE.  CAUSE (5) WHEN MANUAL SELECTED, P/L WILL BE RELEASED IN RIGID POSITION. MOTOR WILL STALL.  WORST CASE UNCOMMANDED RELEASE. UNANNUNCIATED CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING N/A	FAILURE HISTORY THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

PREPARED BY: NFWG

SUPERSEDING DATE: 03 OCT 86

APPROVED BY:

DATE:

**CRITICAL ITEMS LIST**

PROJECT: SAMS  
 ASS'Y NOMENCLATURE: ROTATIONAL HAND CONTROLLER

SYSTEM: D&C CONTROLS SUBSYSTEM  
 ASS'Y P/N: 5115SET17

SHEET: 6

P/N REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOMR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
1530	7	CAPTURE/ RELEASE SWITCH QTY-1 P/N MS 27717-27	MODE: LOSS OR MANUAL CAPTURE AND RELEASE (12.4/6.2)  CAUSE(S): (1) POLE FAILS TO OFF POSITION.  (2) POLE FAILS TO CAPT POSITION.  (3) POLE FAILS TO RELEASE POSITION.  (4) CAPTURE CONTACT FAILS S/C.  (5) RELEASE CONTACT FAILS S/C.	CAUSE (1) NO MANUAL CAPT/ RELEASE CAPABILITY. FOR CAPT. ARM WILL LIMP UNTIL CMD. REMOVED.  CAUSE (2) WHEN MANUAL SELECTED, EE SNARES WILL CLOSE. MOTOR WILL STALL.  CAUSE (3) WHEN MANUAL SELECTED, PAYLOAD WILL BE RELEASED.  CAUSE (4) WHEN MANUAL SELECTED SNARES WILL CLOSE. WHEN RELEASE SELECTED, RELEASE WILL OPERATE CORRECTLY. WHEN RELEASE COMMAND REMOVE, SNARES WILL RECLOSE.  CAUSE (5) WHEN MANUAL SELECTED, P/L WILL BE RELEASED IN RIGID POSITION. MOTOR WILL STALL.  WORST CASE  UNCOMMANDED RELEASE. UNANNUNCIATED CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING  N/A		OPERATIONAL EFFECTS ----- WHEN MANUAL MODE SELECTED AND PAYLOAD CAPTURED EE WILL RELEASE PAYLOAD WITHOUT A COMMAND. ANNUNCIATED.  CREW ACTION ----- USE AUTO MODE.  CREW TRAINING ----- CREW WILL BE TRAINED TO DETECT OFF NOMINAL EE OPERATIONS. IF PAYLOAD CAPTURED CREW WILL BE TRAINED TO SELECT EE MODE AFTER PAYLOAD IS STABILIZED AND AT ITS RELEASE POSITION.  MISSION CONSTRAINTS ----- MODE SWITCH TO BE LEFT IN OFF POSITION UNTIL EE IS IN PRECAPTURE OR RELEASE POSITION. FOR FREE FLYING PAYLOADS OR IN THE CAPTURE ENVELOPE OR RELEASE POSITION FOR BERTHED PAYLOADS. EE MODE SWITCH SHOULD ALWAYS BE PLACED BACK IN THE OFF POSITION IMMEDIATELY AFTER NOMINAL CAPTURE/RIGIDIZE AND RELEASE/BERIGIDIZE TIMES HAVE ELAPSED.  SCREEN FAILURES ----- N/A  OMRSD OFFLINE ----- EXERCISE CAPTURE / RELEASE SWITCH VERIFY CONTINUITY OF MANUAL CONTACTS.  OMRSD ONLINE INSTALLATION ----- WITH EE MODE SWITCH SET TO MANUAL SELECT CAPTURE / RELEASE VERIFY CORRECT VOLTAGES AT LONGERON INTERFACE  OMRSD ONLINE TURNAROUND ----- WITH EE MODE SWITCH SET TO MANUAL VERIFY CAPTURE AND RELEASE FUNCTION

PREPARED BY: MEMG

SUPERSEDING DATE: 06 OCT 87

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