

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: 211401470

SHEET: 1

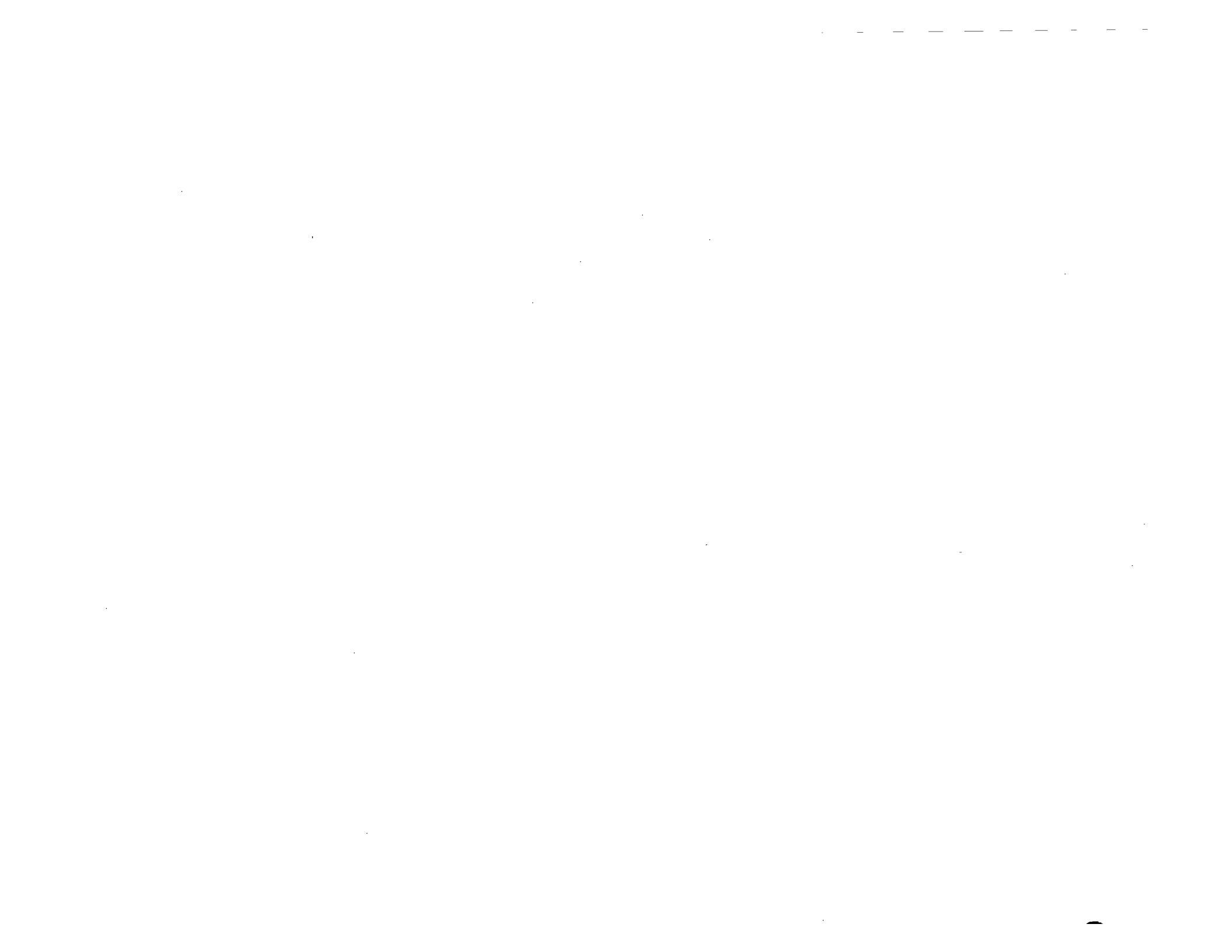
ITEM REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/IRAB CRITICALITY	RATIONALE FOR ACCEPTANCE
3930	0	PAYLOAD PRESENT (CAPTURE) SENSOR QTY-1 SG 459-12-001 (S1 AND S2)	MODE: PAYLOAD CAPTURE MICROSWITCH FAILS LOW. CAUSE(S): (1) 1 SWITCH FAILS CLOSED.	NO EFFECT. 2 SWITCHES IN SERIES. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE INCOMPLETE RIGIDIZE SEQUENCE. UNANNUNCIATED. REDUNDANT PATHS REMAINING OTHER CAPTURE MICROSWITCH		<p>DESIGN FEATURES THE BASIC SWITCHES ARE TYPE MS.27216-6, CONFORMS TO MIL-S-8805. SWITCH CONTACTS ARE GOLD, WITH A BIFURCATED CONFIGURATION. THE SWITCH HOUSING IS HERMITICALLY SEALED. CONTACTS ARE RATED FOR LOW-LEVEL TO 0.5 AMP. SWITCHING. IN THE SRMS APPLICATION, ALL SWITCHED CURRENTS ARE LOW-LEVEL. QA PROCEDURES ENSURE THAT ALL TESTING IS CONDUCTED AT LOW LEVEL CURRENTS.</p> <p>CONNECTIONS TO THE SWITCH ARE BY MEANS OF SOLDERABLE TERMINALS. ALL SOLDERED JOINTS ARE COATED WITH SOLTIVANE TO PRECLUDE SHORT-CIRCUITS. ALL WIRE RUNS ARE PROPERLY SUPPORTED.</p>

PREPARED BY: MFVG

SUPERCEDING DATE: 11 SEP 86

APPROVED BY: _____

RMS/MECH - 144



CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470

SHEET: 2

PMA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / YOUNG. 2/TRAD CRITICALITY	RATIONALE FOR ACCEPTANCE
3930	0	PAYLOAD PRESENT (CAPTURE) SENSOR QTY-1 SG 459-12-001 (S1 AND S2)	MODE: PAYLOAD CAPTURE MICROSWITCH FAILS LOW. CAUSE(S): (1) 1 SWITCH FAILS CLOSED.	NO EFFECT. 2 SWITCHES IN SERIES. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE INCOMPLETE RIGIDIZE SEQUENCE. UNANNUNCIATED. REDUNDANT PATHS REMAINING OTHER CAPTURE MICROSWITCH		<p>ACCEPTANCE TESTS THE EE ASSEMBLY IS TESTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTS:</p> <ul style="list-style-type: none"> O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 7 O THERMAL VACUUM: +70 DEGREES C TO -25 DEGREES C (1 1/2 CYCLES) 1 X 10⁻⁶ TORR <p>THE EE ASSEMBLY IS FURTHER TESTED IN THE IN THE RMS SYSTEM TEST (TP518 RMS STRONGBACK AND TP552 FLAT FLOOR TESTS) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE.</p> <p>QUALIFICATION TESTS THE EE ASSEMBLY QUALIFICATION TESTING CONSISTED OF THE FOLLOWING ENVIRONMENTS:</p> <ul style="list-style-type: none"> O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 7 O SHOCK: 20G/11 MS - 3 AXES (6 DIRECTIONS) O THERMAL VACUUM: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1 X 10⁻⁶ TORR O HUMIDITY: 95% RH (65 DEGREES C MAINTAINED FOR 6 HRS) (65 DEGREES C TO 30 DEGREES C IN 16 HRS) 10 CYCLES 240 HRS. O ENC: MIL-STD-461A AS MODIFIED BY SL-E-0002 (TEST CE01, CE03, CS01, CS02, CS06, RE02 (N/B)) O STRUCTURAL STIFFNESS AND LOAD TEST <p>FLIGHT CHECKOUT PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987</p>

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PROJECT: SRMS
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SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1670

SHEET: 3

PMA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT (N) END ITEM	HOW / FUNC. 2/1RAD CRITICALITY RATIONALE FOR ACCEPTANCE
3930	0	PAYLOAD PRESENT (CAPTURE) SENSOR QTY-1 SG 459-12-001 (S1 AND S2)	<p>MODE: PAYLOAD CAPTURE MICROSWITCH FAILS LOW.</p> <p>CAUSE(S): (1) 1 SWITCH FAILS CLOSED.</p>	<p>NO EFFECT. 2 SWITCHES IN SERIES.</p> <p>WORST CASE</p> <p>LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE INCOMPLETE RIGIDIZE SEQUENCE. UNANNOUNCED.</p> <p>REDUNDANT PATHS REMAINING</p> <p>OTHER CAPTURE MICROSWITCH</p>	<p>QA/INSPECTIONS</p> <p>LEAF ACTUATOR, LOW LEVEL HERMETICALLY SEALED SWITCHES ARE PROCURED TO SPAR SPECIFICATION SG.459/012 AS A QUALIFIED PRODUCT, IN ACCORDANCE WITH THE REQUIREMENTS OF MIL-S-8805/8E, PART NO. MS27216-6 AS REQUIRED BY SPAR SPECIFICATION SG459/012. ADDITIONALLY SWITCHES ARE 100% SCREENED AND BURNED-IN/RUN-IN, 500 CYCLES, TO THE REQUIREMENTS OF SG459/012. SCREENING TEST INCLUDE ACCEPTANCE VIBRATION, THERMAL SHOCK, CONTACT RESISTANCE, INSULATION RESISTANCE, DIELECTRIC WITHSTANDING VOLTAGE, HERMETIC SEAL, PIND TEST, RUN-IN/BURN-IN, RADIOGRAPHIC INSPECTION AND OPERATING CHARACTERISTICS.</p> <p>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.</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 WHB 5300.4(3A) STANDARD, AS MODIFIED BY JSC 06800A.</p> <p>RIGIDIZE AND DERIGIDIZE SENSOR SWITCHES ARE MECHANICALLY ADJUSTED AND FUNCTIONAL TESTED TO THE REQUIREMENTS OF SPAR-TM.1727 PRIOR TO ACCEPTANCE TESTING.</p> <p>PRE-ACCEPTANCE TEST INSPECTION, WHICH INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC., (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-VAC TESTING, (SPAR/GOVERNMENT REP. - 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>

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SHEET: 4

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/IRAB CRITICALITY	RATIONALE FOR ACCEPTANCE
3930	0	PAYLOAD PRESENT (CAPTURE) SENSOR QTY-1 SG 459-12-001 (S1 AND S2)	MODE: PAYLOAD CAPTURE MICROSWITCH FAILS LOW. CAUSE(S): (1) 1 SWITCH FAILS CLOSED.	NO EFFECT. 2 SWITCHES IN SERIES. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE INCOMPLETE RIGIDIZE SEQUENCE. UNANNOUNCIATED. REDUNDANT PATHS REMAINING ----- OTHER CAPTURE MICROSWITCH		

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

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: 511401470

SHEET: 5

YMEA REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / YOUNG. 2/1RAD CRITICALITY	RATIONALE FOR ACCEPTANCE
3930	0	PAYLOAD PRESENT (CAPTURE) SENSOR QTY-1 SG 459-12-001 (S1 AND S2)	MODE: PAYLOAD CAPTURE MICROSWITCH FAILS LOW. CAUSE(S): (1) 1 SWITCH FAILS CLOSED.	NO EFFECT. 2 SWITCHES IN SERIES. WORST CASE ----- LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE INCOMPLETE RIGIDIZE SEQUENCE. UNANNOUNCIATED. REDUNDANT PATHS REMAINING ----- OTHER CAPTURE MICROSWITCH		FAILURE HISTORY ----- THERE HAVE BEEN NO FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.

CRITICAL ITEMS LIST

PROJECT: SRMS
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SYSTEM: MECHANICAL ARM SUBSYSTEM
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SHEET: 6

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 2/1RAB CRITICALITY	RATIONALE FOR ACCEPTANCE
3930	0	PAYLOAD PRESENT (CAPTURE) SENSOR QTY: 1 SG 459-12-001 (S1 AND S2)	MODE: PAYLOAD CAPTURE MICROSWITCH FAILS LOW. CAUSE(S): (1) 1 SWITCH FAILS CLOSED.	NO EFFECT. 2 SWITCHES IN SERIES. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE INCOMPLETE RIGIDIZE SEQUENCE. UNANNUNCIATED. REDUNDANT PATHS REMAINING OTHER CAPTURE MICROSWITCH		<p>OPERATIONAL EFFECTS</p> <p>NONE. FOR SUBSEQUENT FAILURE EE DOES NOT OPERATE NOMINALLY WHEN COMMANDED.</p> <p>CREW ACTION</p> <p>FOR ANY OFF NOMINAL OPERATION OF THE EE, THE EE MODE SWITCH SHOULD BE TURNED OFF. ATTEMPT TO CAPTURE IN THE ALTERNATE MODE. IF THE SNARES REMAIN OPEN, MANEUVER ARM AWAY FROM PAYLOAD. IF SNARES ARE PARTIALLY CLOSED, ATTEMPT RELEASE USING A PRIMARY EE MODE. IF SNARES OPEN, MANEUVER ARM AWAY FROM THE PAYLOAD. MANEUVER ORBITER AWAY FROM PAYLOAD. IF SNARES DON'T OPEN, ATTEMPT TO RELEASE IN BACKUP MODE. IF SNARES OPEN, MANEUVER ARM AWAY FROM THE PAYLOAD. MANEUVER ORBITER AWAY FROM PAYLOAD. IF SNARES CANNOT BE OPENED, IN ANY MODE, EVA CAN BE USED TO RELEASE THE PAYLOAD OR THE ARM/PAYLOAD COMBINATION CAN BE JETTISONED.</p> <p>CREW TRAINING</p> <p>CREW WILL BE TRAINED TO RECOGNIZE OFF NOMINAL EE OPERATIONS AND TO MANEUVER THE ORBITER AWAY FROM A FREE FLYING PAYLOAD AT ANY TIME DURING ARM OPERATIONS.</p> <p>MISSION CONSTRAINT</p> <p>WHEN CAPTURING A FREE FLYING PAYLOAD, THE EE MUST BE FAR ENOUGH AWAY FROM STRUCTURE TO PROHIBIT CONTACT REGARDLESS OF PAYLOAD ROTATIONS. THE EE MODE SWITCH SHOULD BE PLACED BACK IN THE OFF POSITION IMMEDIATELY AFTER THE SPEC DRIVE TIME HAS ELAPSED.</p> <p>SCREEN FAILURES</p> <p>A: CAPTURE IND IS A RESULT OF THE OR'ED OUTPUT OF THE REDUNDANT PATHS. PATHS AREN'T INDIVIDUALLY INSTRUMENTED.</p> <p>B: CAPTURE IND IS A RESULT OF THE OR'ED OUTPUT OF THE REDUNDANT PATHS. PATHS AREN'T INDIVIDUALLY INSTRUMENTED.</p> <p>OMRSD OFFLINE</p> <p>VERIFY INDIVIDUAL OPERATION OF MICRO SWITCH.</p> <p>OMRSD ONLINE INSTALLATION</p> <p>NONE</p>

PREPARED BY: MFWG

SUPERCEDING DATE: 11 SEP 86

APPROVED BY: _____

CRITICAL ITEMS LIST

PROJECT: SBMS
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: 51140E1470

SHEET: 7

ITEM REF.	REV.	NAME QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM		RISK / TIME, 2/1RAD CRITICALITY	RATIONALE FOR ACCEPTANCE
3930	0	PAYLOAD PRESENT (CAPTURE) SENSOR QTY-1 SC 459-12-001 (S1 AND S2)	MODE: PAYLOAD CAPTURE MICROSWITCH FAILS LOW. CAUSE(S): (1) 1 SWITCH FAILS CLOSED.	NO EFFECT. 2 SWITCHES IN SERIES. WORST CASE LOSS OF MISSION. SUBSEQUENT FAILURE MAY CAUSE INCOMPLETE RIGIDIZE SEQUENCE. UNANNUNCIATED. REDUNDANT PATHS REMAINING OTHER CAPTURE MICROSWITCH		CMSD ONLINE TURNAROUND NONE	

PREPARED BY: HMIC

SUPERSEDING DATE: 11 SEP 06

APPROVED BY: _____