

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM  
ASS'Y P/N: 51140E1470-18-3

SHEET: 1

FMEA REF.	FMEA REV.	NAME, QTY. & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: N/A
3710	3	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -18-3	<p>MODE: CAPTURE/ SNARE DRIVE TRAIN DOWN STREAM OF BACKUP CLUTCH SEIZED.</p> <p>CAUSE(S): (1) SEIZED BEARINGS, GEARS ON SNARE DRIVE DOWN STREAM OF BACKUP CLUTCH. (2) SEIZED ROTATING RING/BEARING (3) SEIZED OUTPUT BEARING ON BACKUP RELEASE CLUTCH. (4) SEIZED BACKUP DRIVE TRAIN. (5) JAMMED SPRING RETURN OR. (6) EDDY CURRENT DAMPER SEIZED DUE TO INTERNAL PARTS OR BEARING FAILURE, FOR 51140E147-3 /51140F36-7 END EFFECTOR ONLY.</p>	<p>LOSS OF ABILITY TO CAPTURE OR RELEASE A PAYLOAD IN PRIME MODE. BACKUP RELEASE WILL NOT FUNCTION.</p> <p>WORST CASE ----- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/ RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>	<p>DESIGN FEATURES -----</p> <p>BEARINGS ARE PERMANENTLY LUBRICATED WITH EITHER WET OR DRY LUBRICANT AND ALL THE BEARINGS, WITH EXCEPTION OF THE BEARING SWAGED INTO THE IDLER GEAR BETWEEN THE MOTOR MODULE AND THE SPRING RETURN MECHANISM, ARE CONTAINED WITHIN THE SNARE DRIVE GEARBOX. THE SNARE DRIVE GEARBOX PROVIDES PROTECTION FROM DEBRIS BECOMING TRAPPED IN THE ROLLING ELEMENTS OF THE BEARINGS CAUSING BEARING SEIZURE IN THIS MANNER. THE SWAGED-IN BEARING IS AFFORDED PROTECTION BY THE TORTUOUS PATH WHICH MUST BE TAKEN BY THE DEBRIS AROUND THE BEARING RETAINER AND THE "PRESSED-ON" BALL SEPARATOR TO INGRESS THE ROLLING ELEMENTS OF THE BEARING.</p> <p>ALL SRMS GEARS ARE DESIGNATED IN ACCORDANCE WITH AGMA STANDARDS TO GIVE A MINIMUM OF INFINITE LIFE. THE DEFINITION OF INFINITE LIFE IS THE CONDITION WHERE 10**7 MESH CYCLES OR MORE AT THE APPLIED LOAD WILL NOT RESULT IN TOOTH FAILURE.</p> <p>FOR THIS (THESE) GEAR (S) THE CALCULATED LIFE WAS NOT BASED OR CONTROLLED BY CONSIDERATIONS OF STRESS, BUT INSTEAD WERE SIZED TO SATISFY SPECIAL CONSTRAINTS. CONSEQUENTLY, THE MESH IS WELL WITHIN THE DEFINITION OF INFINITE LIFE AND THE FAILURE MODE STATED IN THE FMEA IS REMOTE.</p> <p>THE APPLIED LOADS DERIVED FOR THIS (THESE) GEAR (S) WERE CATERED TO IN THE SIZING OF THE GEAR MESH. THE MATERIAL ALLOWABLES WERE DERATED BY SPAR AS CONSISTENT FOR FINE PITCH GEARING APPLIED TO POWER TRANSMISSIONS. THE RESULTING MESH DESIGN WAS CHECKED AGAINST THE INFINITE LIFE CRITERIA.</p> <p>THE SOLID FILM LUBRICANT SYSTEM USED IS LUBECO 905. THIS COMPRISES A SPRAY AND CURE (400 DEGREES F) APPLICATION OF MOLYBDENUM DISULPHIDE, IN AN ORGANIC BINDER APPLIED PER PPS:28:11 AND 28:13. BURNISHING AND RUN IN PER SPAR PPS 28:14. THE LUBRICATED BEARING IS TORQUE TRACED TO ENSURE ACCEPTABILITY PER SPAR PPS:28:14.</p> <p>THE GREASE LUBRICANT USED IS BRAYCOTE 601 (FORMERLY 3L-38RP) WHICH HAS A PERFLUORINATED POLYETHER OIL BASE WHICH IS VERY STABLE UNDER VACUUM ENVIRONMENT.</p> <p>THE GREASE IS APPLIED IN PRECISE QUANTITY TO EACH BEARING.</p> <p>THE LIFE OF THE BEARING LUBRICATION HAS BEEN ANALYZED USING ULTIMATE LOADS TO EVALUATE HERTZIAN STRESSES. ULTIMATE LOAD = 1.4 X WORKING LOAD. THE LUBRICANT ON ALL BEARINGS IS GOOD FOR OVER 400 MISSIONS USING THE ULTIMATE LOADS.</p> <p>THE BEARINGS ARE PROCURED BY SPAR AND MEET, OR EXCEED THE REQUIREMENTS OF SPECIFICATION SPAR-SG.393.</p> <p>THE BEARING ANALYSIS USES ULTIMATE LOADS TO DETERMINE THE MARGINS OF SAFETY OF THE LUBRICANT. THE FACTOR BETWEEN WORKING LOADS AND ULTIMATE IS 1.4. THE LUBRICANT FAILURE STRESSES ARE LOWER THAN THE BRINELLING STRESS. LIFE FOR ALL BEARINGS IS GREATER THAN 400 MISSIONS BASED UPON THE ABOVE CRITERIA.</p>	

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM  
 ASS'Y P/N: 51140E1470 1A 1

SHEET: 2

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: N/A
3710	3	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -1A-3	<p>MODE:                      CAPTURE/ SNARE DRIVE TRAIN DOWN STREAM OF BACKUP CLUTCH SEIZED.</p> <p>CAUSE(S):                      (1) SEIZED BEARINGS, GEARS ON SNARE DRIVE DOWN STREAM OF BACKUP CLUTCH.                      (2) SEIZED ROTATING RING/BEARING                      (3) SEIZED OUTPUT BEARING ON BACKUP RELEASE CLUTCH.                      (4) SEIZED BACKUP DRIVE TRAIN.                      (5) JAMMED SPRING RETURN MOTOR.                      (6) EDDY CURRENT DAMPER SEIZED DUE TO INTERNAL PARTS OR BEARING FAILURE, FOR 51140E147-3 /51140F36-7 END EFFECTOR ONLY.</p>	<p>LOSS OF ABILITY TO CAPTURE OR RELEASE A PAYLOAD IN PRIME MODE. BACKUP RELEASE WILL NOT FUNCTION.</p> <p>WORST CASE                      -----                      UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/ RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING                      -----                      N/A</p>	<p>THE ALLOWABLE CONTACT STRESS FOR THE LUBRICANT IS ABOUT 1/5TH THE ALLOWABLE CONTACT STRESS FOR THE BEARING, THEREFORE THE LUBRICANT PROPERTIES DICTATE THE DESIGN. THE BEARINGS AS A RESULT ARE LIGHTLY LOADED AND SURFACE FATIGUE IN THE BEARING MATERIAL IS NOT A VIABLE FAILURE MODE.</p> <p>THE ROTATING RING BEARING IS PERMANENTLY LUBRICATED WITH DRY LUBRICANT AND IS SUITABLY HOUSED IN THE INNER CAGE ASSEMBLY TO PREVENT THE INGRESS OF FOREIGN MATERIAL. IN ADDITION, HEATERS ARE PROVIDED ON THE HOUSING OUTER RING AND A "DESIGNED-IN" CLEARANCE BETWEEN THE BEARING INNER RACE JOURNAL DIAMETER AND THE OUTER RACE HOUSING DIAMETER ENSURE THAT THERE IS NO THERMAL PINCHING OF THE BEARING. THE ROTATING RING IS ALSO ASSISTED BY A THRUST WASHER MADE OF A SELF-LUBRICATING MATERIAL, DUROID, SANDWICHED BETWEEN THE FIXED RING AND THE ROTATING RING. IN THIS SITUATION THE THRUST BEARING IS A REDUNDANT BEARING. SHOULD THE UNLIKELY EVENT OF A ROTATING RING BEARING FAILURE OCCUR THE DUROID THRUST BEARING WOULD STILL ALLOW THE ROTATING RING TO ROTATE OPEN.</p> <p>THE END EFFECTOR PRIME AND BACK-UP RELEASE CLUTCH DESIGNS UTILIZE THREE BEARINGS, TWO OF WHICH ARE IDENTICAL. THE BEARINGS ARE PERMANENTLY LUBRICATED WITH WET LUBRICANT. THE TWO IDENTICAL BEARINGS ARE SEALED WITH TEFLON SEALS AND THE OTHER IS SEALED WITH TEFLON COATED FIBREGLASS SEALS, BOTH SIDES, TO PREVENT THE INGRESS OF DEBRIS.</p> <p>A SEIZED BACKUP DRIVE TRAIN CAN RESULT FROM SEIZED DRIVE BEARINGS OR JAMMED GEARS. BOTH BEARINGS AND GEARS ARE PERMANENTLY LUBRICATED AND PARTIALLY COVERED BY THE SPRING RETURN MOTOR THERMAL COVER WHICH SHIELDS THESE ITEMS FROM THE INGRESS OF DEBRIS.</p> <p>THE SPRING RETURN MOTOR IS GUIDED BY 23 PAIRS OF SHIELDED WET LUBRICATED ROLLER BEARINGS, HENCE THE LIKELIHOOD OF THE NEGATOR SPRING JAMMING DURING OPERATION IS SMALL.</p>	

PREPARED BY: MFVG

SUPERCEDING DATE: 21 SEP 89

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

DATE: 24 JUL 91

CIL REV: 3

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM  
 ASS'Y P/N: 51140E1470-1&3

SHEET: 3

FMEA REF.	FMEA REV.	NAME, QTY. & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: N/A
3710	3	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -1&3	<p>MODE: CAPTURE/ SNARE DRIVE TRAIN DOWN STREAM OF BACKUP CLUTCH SEIZED.</p> <p>CAUSE(S): (1) SEIZED BEARINGS, GEARS ON SNARE DRIVE DOWN STREAM OF BACKUP CLUTCH. (2) SEIZED ROTATING RING/BEARING (3) SEIZED OUTPUT BEARING ON BACKUP RELEASE CLUTCH. (4) SEIZED BACKUP DRIVE TRAIN. (5) JAMMED SPRING RETURN MOTOR. (6) EDDY CURRENT DAMPER SEIZED DUE TO INTERNAL PARTS OR BEARING FAILURE, FOR 51140E147-3 /51140F36-7 END EFFECTOR ONLY.</p>	<p>LOSS OF ABILITY TO CAPTURE OR RELEASE A PAYLOAD IN PRIME MODE. BACKUP RELEASE WILL NOT FUNCTION.</p> <p>WORST CASE ----- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/ RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>	1/1	<p>ACCEPTANCE TESTS ----- THE EE ASSEMBLY IS TESTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTS:</p> <ul style="list-style-type: none"> <li>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 7</li> <li>O THERMAL VACUUM: +70 DEGREES C TO -25 DEGREES C (1 1/2 CYCLES) 1 X 10**6 TORR</li> </ul> <p>THE EE ASSEMBLY IS FURTHER TESTED IN THE IN THE RMS SYSTEM TEST (TP510 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"> <li>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 7</li> <li>O SHOCK: 20G/11 MS - 3 AXES (6 DIRECTIONS)</li> <li>O THERMAL VACUUM: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1 X 10**6 TORR</li> <li>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.</li> <li>O EMC: MIL-STD-461A AS MODIFIED BY SL-E-0002 (TEST CE01, CE03, CS01, CS02, CS06, RE02 (N/B))</li> <li>O STRUCTURAL STIFFNESS AND LOAD TEST</li> </ul> <p>FLIGHT CHECKOUT ----- PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987</p>

**CRITICAL ITEMS LIST**

OBJECT: SRMS  
ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM  
ASS'Y P/N: 51140E1470 1B-3

SHEET: 4

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: N/A
3710	3	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -1B-3	<p>MODE: CAPTURE/ SNARE DRIVE TRAIN DOWN STREAM OF BACKUP CLUTCH SEIZED.</p> <p>CAUSE(S): (1) SEIZED BEARINGS, GEARS ON SNARE DRIVE DOWN STREAM OF BACKUP CLUTCH. (2) SEIZED ROTATING RING/BEARING (3) SEIZED OUTPUT BEARING ON BACKUP RELEASE CLUTCH. (4) SEIZED BACKUP DRIVE TRAIN. (5) JAMMED SPRING RETURN MOTOR. (6) EDDY CURRENT DAMPER SEIZED DUE TO INTERNAL PARTS OR BEARING FAILURE, FOR 51140E147-3 /51140F36-7 END EFFECTOR ONLY.</p>	<p>LOSS OF ABILITY TO CAPTURE OR RELEASE A PAYLOAD IN PRIME MODE. BACKUP RELEASE WILL NOT FUNCTION.</p> <p>WORST CASE ----- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/ RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>	QA/INSPECTIONS -----	<p>UNITS ARE MANUFACTURED UNDER DOCUMENTED QUALITY CONTROLS. THESE CONTROLS ARE EXERCISED THROUGHOUT DESIGN PROCUREMENT, PLANNING, RECEIVING, PROCESSING, FABRICATION, ASSEMBLY, TESTING AND SHIPPING OF THE UNITS. MANDATORY INSPECTION POINTS ARE EMPLOYED AT VARIOUS STAGES OF FABRICATION ASSEMBLY AND TEST. GOVERNMENT SOURCE INSPECTION IS INVOKED AT VARIOUS CONTROL LEVELS.</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>PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE,</p> <p>BEARINGS RECEIVE DIMENSIONAL INSPECTION AT THE SUPPLIER AND VERIFICATION BY SPAR RECEIVING INSPECTION. PRE-ASSEMBLY INSPECTION VERIFIES CIRCULARITY OF BALL TRACKS AND INNER/OUTER RACE DIAMETERS. AFTER ASSEMBLY PRIOR TO LUBRICATION, RADIAL CLEARANCE MEASUREMENTS ARE TAKEN. FOLLOWING LUBRICATION, RUN-IN/BURNISHING AND CLEANING OF DRY LUBE BEARINGS, SPECIALIZED BEARING INSPECTION EQUIPMENT AT SPAR IS USED TO VERIFY QUALITY AND STICTION LEVELS THROUGH STRIP CHART RECORDING OF TORQUE TRACES. BEARINGS ARE THEN RETURNED TO THE SUPPLIER FOR FINAL RADIAL CLEARANCE MEASUREMENTS. GOVERNMENT SOURCE INSPECTION IS ENVOKED ON ALL BEARING PROCUREMENTS.</p> <p>GEAR INSPECTION, BEFORE GEAR LUBRICATION AND RUN-IN A COMPOSITE ERROR GEAR CHECKER IS USED TO VERIFY THAT INVOLUTE FORM, PITCH CIRCLE CONCENTRICITY AND PITCH DIAMETER ARE TO DRAWING REQUIREMENTS. THIS INSPECTION ALSO INCLUDES TEXTURE EVALUATION. AFTER LUBRICATION, GEARS ARE VISUALLY INSPECTED TO CONFIRM APPROPRIATE LUBRICANT APPLICATION AND GEARS ARE THEN RUN-IN, CLEANED AND VISUALLY INSPECTED.</p> <p>THE SPRING RETURN MECHANISM IS INSPECTED AND MANUALLY OPERATED IN ACCORDANCE WITH THE REQUIREMENTS OF SPAR-TM.1657 TO VERIFY CORRECT OPERATION OF MECHANISM. AFTER INTEGRATION TO THE END EFFECTOR ASSEMBLY, PRIOR TO ACCEPTANCE TESTING THE MECHANISM IS FUNCTIONALLY TESTED TO THE REQUIREMENTS OF SPAR-TM.1727.</p> <p>INSPECTION VERIFIES THAT KITTED PARTS ARE CORRECT PRIOR TO ASSEMBLY AND TRACEABILITY INFORMATION RECORDED.</p> <p>INSPECTION TO DRAWING IS CONDUCTED THROUGHOUT THE ASSEMBLY PROCESS, INCLUDING INSPECTION OF LOCKING, WITNESSING OF TORQUING AND APPLICATION OF TORQUE STRIPING.</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>

PREPARED BY: MFVG

SUPERCEDING DATE: 21 SEP 89

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

DATE: 24 JUL 91

CIL REV: 3

**CRITICAL ITEMS LIST**

PROJECT: SRMS

SYSTEM: MECHANICAL ARM SUBSYSTEM

ASS'Y NOMENCLATURE: END EFFECTOR

ASS'Y P/N: 51140E1470-1&-3

SHEET: 5

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 1/1 CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: N/A
3710	3	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -1&-3	<p>MODE: CAPTURE/ SNARE DRIVE TRAIN DOWN STREAM OF BACKUP CLUTCH SEIZED.</p> <p>CAUSE(S):                      (1) SEIZED BEARINGS, GEARS ON SNARE DRIVE DOWN STREAM OF BACKUP CLUTCH.                      (2) SEIZED ROTATING RING/BEARING                      (3) SEIZED OUTPUT BEARING ON BACKUP RELEASE CLUTCH.                      (4) SEIZED BACKUP DRIVE TRAIN.                      (5) JAMMED SPRING RETURN MOTOR.                      (6) EDDY CURRENT DAMPER SEIZED DUE TO INTERNAL PARTS OR BEARING FAILURE, FOR 51140E147-3 /51140F36-7 END EFFECTOR ONLY.</p>	<p>LOSS OF ABILITY TO CAPTURE OR RELEASE A PAYLOAD IN PRIME MODE. BACKUP RELEASE WILL NOT FUNCTION.</p> <p>WORST CASE                      -----                      UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/ RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING                      -----                      N/A</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>

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM  
 ASS'Y P/N: 51140E1470-18-3

SHEET: 6

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE SCREENS: N/A
3710	3	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -18-3	MODE: CAPTURE/ SNARE DRIVE TRAIN DOWN STREAM OF BACKUP CLUTCH SEIZED.  CAUSE(S): (1) SEIZED BEARINGS, GEARS ON SNARE DRIVE DOWN STREAM OF BACKUP CLUTCH. (2) SEIZED ROTATING RING/BEARING (3) SEIZED OUTPUT BEARING ON BACKUP RELEASE CLUTCH. (4) SEIZED BACKUP DRIVE TRAIN. (5) JAMMED SPRING RETURN MOTOR. (6) EDDY CURRENT DAMPER SEIZED DUE TO INTERNAL PARTS OR BEARING FAILURE, FOR 51140E147-3 /51140F36-7 END EFFECTOR ONLY.	LOSS OF ABILITY TO CAPTURE OR RELEASE A PAYLOAD IN PRIME MODE. BACKUP RELEASE WILL NOT FUNCTION.  WORST CASE ----- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/ RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. 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:

MFNG

SUPERCEDING DATE: 21 SEP 89

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

DATE: 26 JUL 91

CTL REV: 3

**CRITICAL ITEMS LIST**

PROJECT: SRMS

ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM

ASS'Y P/N: 51140E1470-1&-3

SHEET: 7

FMEA REF.	FMEA REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. CRITICALITY RATIONALE FOR ACCEPTANCE SCREENS: N/A
3710	3	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -1&-3	<p>MODE: CAPTURE/ SNARE DRIVE TRAIN DOWN STREAM OF BACKUP CLUTCH SEIZED.</p> <p>CAUSE(S): (1) SEIZED BEARINGS, GEARS ON SNARE DRIVE DOWN STREAM OF BACKUP CLUTCH. (2) SEIZED ROTATING RING/BEARING (3) SEIZED OUTPUT BEARING ON BACKUP RELEASE CLUTCH. (4) SEIZED BACKUP DRIVE TRAIN. (5) JAMMED SPRING RETURN MOTOR. (6) EDDY CURRENT DAMPER SEIZED DUE TO INTERNAL PARTS OR BEARING FAILURE FOR 51140E147-3 /51140F36-7 END EFFECTOR ONLY.</p>	<p>LOSS OF ABILITY TO CAPTURE OR RELEASE A PAYLOAD IN PRIME MODE. BACKUP RELEASE WILL NOT FUNCTION.</p> <p>WORST CASE ----- UNEXPECTED PAYLOAD MOTION. INCOMPLETE CAPTURE/RELEASE SEQUENCE. UNABLE TO RELEASE PAYLOAD. CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING ----- N/A</p>	<p>OPERATIONAL EFFECTS ----- EE DOES NOT OPERATE NOMINALLY WHEN COMMANDED. ARM REMAINS LIMP UNTIL EE MODE SW. IS TURNED OFF DURING CAPTURE SEQ. CANNOT RELEASE PAYLOAD IN ANY MODE. EVA RELEASE OF GRAPPLE FIXTURE IS A DESIGN FEATURE, IF THIS IS NOT POSSIBLE PAYLOAD MUST BE JETTISONED WITH ARM.</p> <p>CREW ACTION ----- EVA RELEASE OF PAYLOAD. IF EVA NOT POSSIBLE THEN THE ARM/PAYLOAD COMBINATION MUST BE JETTISONED.</p> <p>CREW TRAINING ----- CREW WILL BE TRAINED TO RECOGNIZE OFF NOMINAL EE OPERATIONS.</p> <p>MISSION CONSTRAINT ----- WHEN CAPTURING A FREE FLYING PAYLOAD. THE EE MUST BE FAR ENOUGH AWAY FROM STRUCTURE TO PROHIBIT CONTACT REGARDLESS OF PAYLOAD ROTATIONS. EE MODE SWITCH SET TO OFF POSITION IMMEDIATELY AFTER SPEC DRIVE TIME HAS ELAPSED.</p> <p>OMRSD OFFLINE ----- PERFORM MANUAL CAPTURE/RELEASE FUNCTION. VERIFY CORRECT FLAG TIMING OPEN TO CLOSE.</p> <p>OMRSD ONLINE INSTALLATION ----- NONE</p> <p>OMRSD ONLINE TURNAROUND ----- PERFORM MANUAL CAPTURE/RELEASE FUNCTION. VERIFY CORRECT FLAG TIMING OPEN TO CLOSE.</p>