

CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL WMM SUBSYSTEM
ASS'Y P/N: 51140C1477-1B-3 SHEET: 1

PREL REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HOUR / FUNC. I/F CRITICALITY	RATIONALE FOR ACCEPTANCE
3700	1	CAPTURE/SHAKE MECHANISM QTY-4 PART OF 51140C1477-1B-3	<p>MODE: CAPTURE/SHAKE DRIVE TRAIN FAILS FREE.</p> <p>CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OF SHAFT FAILURE. (3) GEAR FASTENER FAILURE.</p>	<p>LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ.</p> <p>WORST CASE UNCOMMANDING RELEASE. CREW ACTION REQUIRED.</p> <p>REDUANT PARTS REMAINING</p> <p>N/A</p>		<p>DESIGN FEATURES</p> <p>THE END EFFECTOR BACK-UP RELEASE CLUTCH IS A MAJOR BOUGHT OUT-PART WHICH IS SUPPLIED BY SPERRY CORPORATION. HEADSPACE AND MESHING GROUP AND MEETS OR EXCEEDS THE REQUIREMENTS OF SPECIFICATION SPAR-56.931. IT SHOULD BE NOTED THAT THIS IS A BOG-TOOTH CLUTCH.</p> <p>THE CLUTCH SHAFT AND ARMATURE ARE CONNECTED BY A SPLINE WHICH PROVIDES MOTION TO THE ARMATURE AND ALLOWS AXIAL SLIDING FOR ENGAGEMENT AND DISENGAGEMENT. THE FOLLOWING IS A LIST OF CHARACTERISTICS TO LIMIT THE POSSIBILITY OF THE CLUTCH HANGING UP DUE TO MECHANICAL BINDING OF THE SPLINE:</p> <p>THE SPLINES ARE MATCH-MACHINED FOR A PRECISE AND SMOOTH FIT. SERIALIZATION OF THE MATED PARTS ASSURES PROPER ASSEMBLY.</p> <p>THE MATED SHAFT AND ARMATURE ASSEMBLY IS INSPECTED FOR PROPER CLEARANCE AND SMOOTHNESS OF OPERATION.</p> <p>THE UNIT IS TESTED A MINIMUM OF SEVEN TIMES DURING ACCEPTANCE TESTING FOR POTENTIAL BRUISING. THE TEST CONSISTS OF APPLYING FULL RATED LOAD TORQUE WITH THE UNIT ENGAGED. A VOLTAGE IS THEN APPLIED TO DISENGAGE THE UNIT. THE TIME FROM APPLICATION OF VOLTAGE UNTIL FULL DISENGAGEMENT IS MEASURED. ANY BINDING OF THE ARMATURE WOULD EITHER PREVENT DISENGAGEMENT OR CAUSE AN EXCESSIVE TIME DELAY.</p> <p>THE SPLINES ARE LUBRICATED WITH POLYDENEUM DISULFIDE.</p> <p>THE UNIT LOAD LEVELS ON THE SPLINE ARE LOW.</p> <p>IT SHOULD BE NOTED THAT THESE UNITS DO NOT UTILIZE REDUNDANT SPLINES.</p> <p>THE BEARINGS ARE MET LUBRICATED WITH BRAYCOTE 32-300P.</p> <p>MATERIALS SELECTION AND USAGE CONFORMS TO SPAR-56.358 WHICH IS COMPLYANT TO THE NASA MATERIALS USAGE REQUIREMENTS.</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 10⁶ MESH CYCLES OR MORE AT THE APPLIED LOAD WILL NOT RESULT IN TOOTH FAILURE.</p> <p>UNIT LOADS WERE CALCULATED TO DETERMINE THE STRENGTH OF THE GEARS IN SHAKE AND RIGIDIZE GEAR TRAINS. THE UNIT LOAD IN THIS CONTEXT, IS A STRESS INDICATOR AND IS GIVEN BY THE FOLLOWING FORMULA:</p> $\text{UNIT LOAD} = \frac{(\text{TANGENTIAL GEAR LOAD}) (\text{DIAMETRAL PITCH})}{(\text{FACE WIDTH})}$ <p>A VALUE OF 15,000 POUNDS PER IN. PER INCH (FOR STATIC CONDITIONS) WAS A DESIGN GOAL FOR GEARS IN THE END EFFECTOR. IT IS NOT A STRESS AND MUST NOT BE CONSIDERED AS A LIMITING OR</p>

PREPARED BY: RME

SUPERSEDING DATE: 06 OCT 97

APPROVED BY:

DATE:

RMS/MECH - 64

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: 51140E147B-16 1 SHEET: 2

P/N & REF.	REV.	WIRE QTY. & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HORN / FUNC. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
3700	1	CAPTURE / SNARE MECHANISM QTY-1 PART OF 51140E1477-1A-3	<p>MODE: CAPTURE / SNARE DRIVE TRAIN FAILS FREE.</p> <p>CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OR SNARE FAILURE. (3) GEAR FASTENER FAILURE.</p>	<p>LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ.</p> <p>WORST CASE UNCOMMANDS RELEASE. CREW ACTION REQUIRED.</p> <p>REDDUNDANT PATHS REMAINING N/A</p>	<p>ULTIMATE VALUE</p> <p>THE STRUCTURAL ANALYSIS CONDUCTED ON THE END EFFECTOR, PER SPAR-TR.1531, CONFIRMED A POSITIVE MARGIN OF SAFETY FOR ALL END EFFECTOR PARTS AND GEARS. THE MARGIN OF SAFETY FOR ULTIMATE STRENGTH (UTS) INCORPORATES A FACTOR OF SAFETY OF 1.4 AGAINST LIMIT LOAD, AS SPECIFIED IN SPAR-SG. 392.</p> <p>A NEGATIVE MARGIN DOES NOT NECESSARILY IMPLY BREAKAGE OF THE PART. RATHER IT INDICATES THAT A LIMITING STRESS LEVEL ESTABLISHED BY THE FACTOR OF SAFETY, HAS BEEN EXCEEDED.</p> <p>THE MARGIN OF SAFETY FOR YIELD STRENGTH (SYIELD) EMPLOYS A FACTOR OF SAFETY OF 1.0 AGAINST LIMIT LOAD, AS SPECIFIED IN SPAR-SG.392. TABLE 14 LISTS MARGINS OF SAFETY FOR SRMS STRUCTURAL COMPONENTS.</p> <p>A FATIGUE ANALYSIS WHICH SHOWS INDEFINITE LIFE HAS BEEN PERFORMED ON THE GEARS AND MECHANICAL FASTENERS AND A FRACTURE ANALYSIS WHICH SHOWS LIVES GREATER THAN 424 MISSIONS HAS BEEN DEMONSTRATED ON STRUCTURAL COMPONENTS WITHIN THE END EFFECTOR.</p> <p>A MARGIN OF SAFETY IN EXCESS OF 2.0 HAS BEEN DETERMINED FOR THE FASTENER CONNECTION BETWEEN THE QUADRANT GEAR AND THE ROTATING RING. FOR THIS CONNECTION TO FAIL A LOAD 0.4 TIMES GREATER THAN THE NORMAL OPERATING LOAD MUST BE APPLIED. THIS SITUATION IS HIGHLY UNLIKELY.</p>	

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: S1140E1470-1B 3 SHEET

P/N REF.	REV.	PART, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FUNC I/S CRITICALITY	RATIONALE FOR ACCEPTANCE
3700	1	CAPTURE/ SNARE MECHANISM QTY-1 PART OF S1140E1477 -1B-3	MODE: CAPTURE/ SNARE DRIVE TRAIN FAILS FREE. CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN MISENGAGED POSITION. (2) GEAR OR SHAFT FAILURE. (3) GEAR FASTENER FAILURE.	LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ. WORST CASE - UNCOMMANDED RELEASE, CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING ----- N/A		ACCEPTANCE TESTS ----- THE EE ASSEMBLY IS TESTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTS: 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 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. QUALIFICATION TESTS ----- THE EE ASSEMBLY QUALIFICATION TESTING CONSISTED OF THE FOLLOWING ENVIRONMENTS: 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 EMC: MIL-STD-461A AS MODIFIED BY SL-E-0002 (TEST CE01, CE03, CS01, CS02, CS06, RCD2 (N/B)) O STRUCTURAL STIFFNESS AND LOAD TEST FLIGHT CHECKOUT ----- PDRS OPS CHECKLIST (ALL VEHICLES) JSC 16987

PREPARED BY: RWG

SUPERSEDING DATE: 06 OCT 87

APPROVED BY:

DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: EMB EFFECTOR

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

P/N REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON EMB ITEM	HOUR / FUNC. / CRITICALITY	RATIONALE FOR ACCEPTANCE
3700	1	CAPTURE / SNARE MECHANISM QTY-1 PART OF 51140E1477 -1B-1	<p>MODE: CAPTURE / SNARE DRIVE TRAIN FAILS FREE.</p> <p>CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OR SHAFT FAILURE. (3) GEAR FASTENER FAILURE.</p>	<p>LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ.</p> <p>WORST CASE ----- UNCOMMANDED RELEASE. FREN ACTION REQUIRED.</p> <p>REBUNDANT PATHS REMAINING ----- N/A</p>	<p>QA/INSPECTIONS</p>	<p>UNITS ARE MAJOR BOUGHT OUT PARTS, MANUFACTURED, ASSEMBLED AND TESTED TO SPAR DRAWINGS AND SPECIFICATIONS UNDER DOCUMENTED QUALITY CONTROLS. THESE CONTROLS ARE EXERCISED THROUGHOUT DESIGN, PROCUREMENT, PLANNING, PROCESSING, FABRICATION, ASSEMBLY QUALIFICATION AND ACCEPTANCE TESTING. MANDATORY INSPECTION POINTS ARE EMPLOYED AS APPROPRIATE AT VARIOUS LEVELS OF ASSEMBLY AND TEST. SPAR/GOVERNMENT SOURCE INSPECTION IS ENVOLED ON THE SUPPLIER.</p> <p>WIRE IS PROCURED TO SPECIFICATION MIL-W-22759 OR MIL-W-8191 AND INSPECTED AND TESTED TO NASA JSC8000 STANDARD NUMBER 10A.</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 TO THE APPLICABLE SPAR INSPECTION TEST PROCURE (ITP). PRIOR TO M/W INTEGRATION, INSPECTIONS INCLUDE CLEANLINESS USING M.V., GENERAL WORKMANSHIP, DIMENSIONAL SPLINE FOR DRY LUBRICATION, CORRECT INSTALLATION OF BEARING, WIRE LEADS FOR DAMAGE, IDENTIFICATION AND FUNCTIONAL TEST TO VERIFY BRAKE SLIP TORQUE, STICTION, DROPOUT VOLTAGE, PULL IN VOLTAGE ETC.</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/BURRISHING 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 ENVOLED 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>SHAFTS ARE DIMENSIONAL INSPECTED TO DRAWING REQUIREMENTS THROUGHOUT THE MANUFACTURING STAGES. FOLLOWING HEAT TREATMENT THE SHAFTS ARE SUBJECTED TO MAGNETIC PARTICLE INSPECTION FOR CRACKS.</p>

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASSY NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASSY P/N: 5110E1470-1A | SHEET: 5

P/N & REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOW / TUNG. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
370B	J	CAPTURE / SMARC MECHANISM QTY-1 PART OF 51140E1477 -1A-3	<p>NOTE: CAPTURE / SMARC DRIVE TRAIN FAILS FREE.</p> <p>CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OR SHAFT FAILURE. (3) GEAR FASTENER FAILURE.</p>	<p>LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ.</p> <p>WORST CASE</p> <p>UNCOMMANDED RELEASE. CREW ACTION REQUIRED.</p> <p>REDUANTARY PATHS REMAINING</p> <p>N/A</p>		<p>INTEGRATION OF UNIT TO ROTOR MODULE - INSPECTIONS INCLUDE GRINDING CHECKS, CONNECTOR FOR BENT PINS, VISUAL CLEANLINESS, INTERCONNECT WIRING ETC.</p> <p>ROTOR MODULES ARE TESTED TO THE REQUIREMENTS OF SPAR IN 1624 WHICH INCLUDES CONTINUITY AND ISOLATION CHECKS, STICKION, COMMUTATOR TIMING, AMBIENT AND THERMAL TESTING. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT).</p> <p>INTEGRATION OF ROTOR MODULE TO END EFFECTOR LHM - INSPECTIONS INCLUDE GROUNDING CHECKS, CONNECTORS FOR BENT OR PUSHBACK CONTACTS, INCORRECT WIRING ETC.</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 VNC 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>

PREPARED BY: NMO

SUPERSEDES DATE: 06 OCT 87

APPROVED BY:

DATE:

CRITICAL ITEMS LIST

PROJECT: SBMS
 ASS'Y NOMENCLATURE: ARM EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: S1140E1470-1A 3 SHEET: 6

P/N & REF.	REV.	NAME, QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HDMR / FUNC. I/F CRITICALITY	RATIONALE FOR ACCEPTANCE
3700	1	CAPTURE/ SNARE MECHANISM QTY-1 PART OF S1140E1477 -1A-3	MODE: CAPTURE/ SNARE DRIVE TRAIN FAILS FREE. CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OR SHAFT FAILURE. (3) GEAR FASTENER FAILURE.	LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ. WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED. REDDUNDANT PATHS REMAINING R/A		FAILURE HISTORY THE FOLLOWING FAILURE ANALYSIS REPORT(S) ARE RELEVANT: FAR 5009- S/N 201 SEP 79 DESCRIPTION RIGIDIZE SHAFT MOVED, CAUSED BY MISALIGNED CLUTCH CORRECTIVE ACTION CHANGED CLUTCH ECM S1140 1477, 2154 1A70 AND ECR 18954

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: 51140E1470 1E 3 SHEET: 2

P/N REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDMR / FINEC / I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
3300	1	CAPTURE/ SNARE MECHANISM QTY-1 PART OF 51140E1477 -1A-3	MODE: CAPTURE/ SNARE DRIVE SHAFT FAILS FREE. CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OR SHAFT FAILURE. (3) GEAR FASTENER FAILURE.	LOSS OF ABILITY TO CAPTURE A PAYLOAD IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ. WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING N/A		OPERATIONAL EFFECTS ----- PAYLOAD WILL BE RELEASED WITH NO OPERATOR COMMAND. IF THIS OCCURS WHILE THE ARM IS BEING DRIVEN, THE PAYLOAD WILL TAKE AN UNEXPECTED TRAJECTORY. DURING CAPTURE SEQUENCE ARM REMAINS LIMP UNTIL EE MODE SWITCH SET TO OFF. CREW ACTION ----- MANEUVER ARM AND ORBITER AWAY FROM PAYLOAD. CREW TRAINING ----- THE CREW WILL BE TRAINED TO MANEUVER THE ORBITER AWAY FROM A FREE FLYING PAYLOAD AT ANY TIME DURING ARM OPERATIONS. MISSION CONSTRAINT ----- OPERATE UNDER VERMICH RATES WITHIN 10 FT OF STRUCTURE. THE OPERATOR MUST BE ABLE TO DETECT THAT THE ARM/PAYLOAD IS RESPONDING PROPERLY TO COMMANDS VIA WYBROW AND/OR CCTV VIEWS DURING ALL ARM OPERATIONS. EE MODE SWITCH SET TO OFF POSITION IMMEDIATELY AFTER SPEC DRIVE TIME HAS ELAPSED. WHEN CAPTURING A FREE FLYING PAYLOAD, THE EE MUST BE FAR ENOUGH AWAY FROM STRUCTURE TO PREVENT CONTACT REGARDLESS OF PAYLOAD ROTATIONS. SCREEN FAILURES ----- N/A OMSD OFFLINE ----- PERFORM MANUAL CAPTURE/RELEASE FUNCTION. VERIFY CORRECT FLAG TIMING OPEN TO CLOSE. OMSB ONLINE INSTALLATION ----- NONE OMSD ONLINE FORWARD ----- PERFORM MANUAL CAPTURE/RELEASE FUNCTION. VERIFY CORRECT FLAG TIMING OPEN TO CLOSE.

PREPARED BY: WMC IMPROVING DATE: 26 OCT 87 APPROVED BY: DATE:

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y WORK/ENCLOSURE: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: 51140E147D-18

SHEET: 6

P/N REF.	REV.	WARE QTY & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HOMR / FUNC. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
3700	4	CAPTURE/SHARE MECHANISM QTY-1 PART OF 51140E1477-18-3	MODE: CAPTURE/SHARE DRIVE TRAIN FAILS FREE. CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OR SHAFT FAILURE. (3) GEAR FASTENER FAILURE.	LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ. WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING N/A	FAILURE HISTORY THE FOLLOWING FAILURE ANALYSIS REPORT(S) ARE RELEVANT: FAR 5009: 5/N 281 SEP 79 DESCRIPTION RIGIDIZE SHAFT MOVED, CAUSED BY MISALIGNED CLUTCH CORRECTIVE ACTION CHANGED CLUTCH ECM 51140 1477, 2154 1478 AND ECA 10954	

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y IDENTIFICATION: END EFFECTOR

SYSTEM: MECHANICAL ARM SUBSYSTEM
 ASS'Y P/N: 5114761470 18 1 SHEET: 2

PTRA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HORN / FINE, I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
3780	1	CAPTURE/SHARE MECHANISM QTY-1 PART OF 5114761477 -16-3	MODE: CAPTURE/SHARE DRIVE TRAIN FAILS FREE. CAUSE(S): (1) FAILURE OF BACKUP CLUTCH IN DISENGAGED POSITION. (2) GEAR OR SHAFT FAILURE. (3) GEAR FASTENER FAILURE.	LOSS OF ABILITY TO CAPTURE A PAYLOAD. IF A PAYLOAD IS CAPTURED IT WILL BE RELEASED. ARM WILL REMAIN LIMP IN AUTO CAPTURE SEQ. WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING N/A		OPERATIONAL EFFECTS ----- PAYLOAD WILL BE RELEASED WITH NO OPERATOR COMMAND. IF THIS OCCURS WHILE THE ARM IS BEING DRIVEN, THE PAYLOAD WILL TAKE AN UNEXPECTED TRAJECTORY DURING CAPTURE SEQUENCE ARM REMAINS LIMP UNTIL EE MODE SWITCH SET TO OFF. CREW ACTION ----- MANEUVER ARM AND ORBITER AWAY FROM PAYLOAD. CREW TRAINING ----- THE CREW WILL BE TRAINED TO MANEUVER THE ORBITER AWAY FROM A FREE FLYING PAYLOAD AT ANY TIME DURING ARM OPERATIONS. MISSION CONSTRAINT ----- OPERATE UNDER VERNIER BATES WITHIN 10 FT OF STRUCTURE. THE OPERATOR MUST BE ABLE TO DETECT THAT THE ARM/PAYLOAD IS RESPONDING PROPERLY TO COMMANDS VIA WINDOW AND/OR CCTV VIEWS DURING ALL ARM OPERATIONS. EE MODE SWITCH SET TO OFF POSITION IMMEDIATELY AFTER SPEC DRIVE TIME HAS ELAPSED. WHEN CAPTURING A FREE FLYING PAYLOAD, THE EE MUST BE FAR ENOUGH AWAY FROM STRUCTURE TO PROHIBIT CONTACT REGARDLESS OF PAYLOAD ROTATIONS. SCREEN FAILURES ----- N/A OMSD OFFLINE ----- PERFORM MANUAL CAPTURE/RELEASE FUNCTION. VERIFY CORRECT FLAG TIMING OPEN TO CLOSE. OMSD ONLINE INSTALLATION ----- NONE OMSD ONLINE TURNAROUND ----- PERFORM MANUAL CAPTURE/RELEASE FUNCTION. VERIFY CORRECT FLAG TIMING OPEN TO CLOSE.

PREPARED BY: HEM

SUPERSEDING DATE: 06 OCT 87

APPROVED BY: _____

DATE: _____