## CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51T40E1470
SHEET: 1

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>---<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>---<br>EE AUTO AND MANUAL | DESIGN FEATURES<br>---<br><br>THE END EFFECTOR BACK-UP RELEASE CLUTCH IS A MAJOR BOUGHT-OUT-PART WHICH IS SUPPLIED BY SPERRY CORPORATION, AEROSPACE AND MARINE GROUP AND MEETS OR EXCEEDS THE REQUIREMENTS OF SPECIFICATION SPAR-SG.531. IT SHOULD BE NOTED THAT THIS IS A DOG-TOOTH CLUTCH.<br><br>THE FOLLOWING IS A LIST OF DESIGN CHARACTERISTICS THAT LIMIT THE POSSIBILITY OF AN OPEN OR SHORT CIRCUIT IN THE UNIT WINDINGS:<br><br>THE INSULATION SYSTEM IS CLASS 185 (185 DEGREES C) OR BETTER AND IS PROVEN THROUGH YEARS OF USE.<br><br>THE WIRE USED IN THE UNITS IS HEAVY ML MAGNET WIRE WHICH HAS AN EXTRA COAT OF INSULATION ON THE MAGNET WIRE.<br><br>THE WINDINGS ARE PREBAKED AFTER THE WINDINGS ARE FORMED BUT PRIOR TO IMPREGNATION. THIS IS A STRESS RELIEVING OPERATION OF BOTH THE COPPER WIRE AND THE INSULATION, PERFORMED TO MINIMIZE ANY DEGRADATION DURING PROCESSING.<br><br>KAPTON TAPE IS APPLIED OVER THE BOBBIN AND WINDINGS O.D. TO PROTECT THE MAGNET WIRE DURING PROCESSING AND INSTALLATION.<br><br>THE UNIT IS IMPREGNATED WITH 100% SOLID EPOXY THAT IMPROVES THE COIL MECHANICAL PROPERTIES ESPECIALLY DURING VIBRATION AND HELPS THE UNIT RUN COOLER BY INCREASING THE EFFECTIVE THERMAL CONDUCTION WITHIN THE WINDING MASS.<br><br>IT SHOULD BE NOTED THAT THE MAGNET WIRE USED IN THE WINDINGS OF THESE UNITS IS SINGLE STRAND.<br><br>TO LIMIT THE POSSIBILITY OF A LOSS OF INPUT VOLTAGE DUE TO AN OPEN LEAD WIRE ALL SOLDERING IS ACCOMPLISHED BY OPERATORS WHO ARE TRAINED AND CERTIFIED TO NASA NHB 5300.4 (3A) STANDARD, AS MODIFIED BY JSC 08800A.<br><br>CONNECTOR USED ARE TO GSFC SPECIFICATION S.311.P.4/9.<br><br>CONTACTS USED ARE TO GSF SPEC.S.311.P.4/9.<br><br>CRIMPING IS CONTROLLED TO SPAR PPS 9:17 WHICH EMBODIES MSC-SPEC-Q-1A.<br><br>MATERIALS SELECTION AND USAGE CONFORMS TO SPAR-SG.368 WHICH IS EQUIVALENT TO THE NASA MATERIALS USAGE REQUIREMENTS.<br><br>THE STRUCTURAL ANALYSIS CONDUCTED ON THE END EFFECTOR, PER SPAR-TM.1531, CONFIRMED A POSITIVE MARGIN OF SAFETY FOR ALL END EFFECTOR PARTS AND GEARS. THE MARGIN OF SAFETY FOR ULTIMATE STRENGTH M(UTS) INCORPORATES A FACTOR OF SAFETY OF 1.4 AGAINST LIMIT LOAD, AS SPECIFIED IN SPAR-SG. 392.<br><br>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. |

PREPARED BY: MEWG
SUPERCEDING DATE: 1 OCT 89

DATE: 07 DEC 90
CIL REV: 4

# CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
SHEET: 2

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY | RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>----------<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>----------<br>EE AUTO AND MANUAL | | THE MARGIN OF SAFETY FOR YIELD STRENGTH S(YIELD) 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.<br><br>A FATIGUE ANALYSIS WHICH SHOWS INDIFINITE 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.<br><br>THE BACK-UP RELEASE CLUTCH DESIGN USES ONE COMPRESSION SPRING, PILOTED ON THE ARMATURE SPLINE TUPE, TO PROVIDE THE FORCE FOR ENGAGING THE DOG-TOOTH GEARS. THE TOTAL LOSS OF THE STIFFNESS OF FRACTURE OF THE SPRING WOULD RESULT IN NO TORQUE TRANSMISSION ACROSS THE CLUTCH. THE SPRING IS NOT SUBJECT TO FATIGUE FAILURE BECAUSE DURING OPERATION IT IS ESSENTIALLY UNDER CONSTANT STRESS, I.E. CLUTCH ACTUATION INVOLVES SPRING DEFLECTIONS OF 0.017 TO 0.019 INCHES. THE SPRING UNDER OPERATING CONDITIONS HAS A MARGIN OF SAFETY FOR ULTIMATE TENSILE SIRENGIH (MUIS) OF POSITIVE 0.50 FOR FRACTURE IN SHEAR.<br><br>IN THE IMPROBABLE EVENT OF SPRING FRACTURE, THE SPRING HOUSING WILL RETAIN ANY DEBRIS.<br><br>THE SPRING IS STAINLESS STEEL, FS302 OR FS304, MANUFACTURED TO MATERIAL SPECIFICATION QQ-W-423. DURING THE MANUFACTURING OF A BATCH OF SPRINGS, A LOT IS REMOVED AND INSPECTED BY QC FOR DIMENSIONAL AND MATERIAL COMPLIANCE, AND LOAD VERSUS DEFLECTION.<br><br>THE NEGATOR SPRING USED ON THE SPRING RETURN MECHANISM HAS BEEN ENDURANCE TESTED TO 2000 CYCLES WITHOUT FAILURE IN ACCORDANCE WITH SPAR-T.207. UPON COMPLETION OF THE ENDURANCE TESTING THERE WAS NO DEGRADATION OBSERVED IN THE SPRING TORQUE OR ANY EVIDENCE OF WEAR ON THE NEGATOR SPRING SURFACES. |

PREPARED BY: MEWG
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DATE: 07 DEC 90
CIE REV: 4

# CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51T40ET470
SHEET: 3

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>---<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>---<br>EE AUTO AND MANUAL | ACCEPTANCE TESTS<br>---<br>THE EE ASSEMBLY IS TESTED TO THE FOLLOWING ACCEPTANCE ENVIRONMENTS:<br><br>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 7<br><br>O THERMAL VACUUM: +70 DEGREES C TO -25 DEGREES C (1 1/2 CYCLES) 1 X 10**6 TORR<br><br>THE EE ASSEMBLY IS FURTHER TESTED IN THE IN THE RMS SYSTEM TEST (TP51B RMS STRONGBACK AND TP552 FLAT FLOOR TESTS) WHICH VERIFIES THE ABSENCE OF THE FAILURE MODE.<br><br>QUALIFICATION TESTS<br>---<br>THE EE ASSEMBLY QUALIFICATION TESTING CONSISTED OF THE FOLLOWING ENVIRONMENTS:<br><br>O VIBRATION: LEVEL AND DURATION - REFERENCE TABLE 7<br><br>O SHOCK: 20G/11 MS - 3 AXES (6 DIRECTIONS)<br><br>O THERMAL VACUUM: +81 DEGREES C TO -36 DEGREES C (6 CYCLES) 1 X 10**6 TORR<br><br>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.<br><br>O EMC: MIL-STD-461A AS MODIFIED BY SL-E-0002 (TEST CE01, CE03, CS01, CS02, CS06, RE02 (N/B))<br><br>O STRUCTURAL STIFFNESS AND LOAD TEST<br><br>FLIGHT CHECKOUT<br>---<br>PORS OPS CHECKLIST (ALL VEHICLES) JSC 16987 |



PREPARED BY: MFWG
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## CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
SHEET: 4

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY | RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>---<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>---<br>EE AUTO AND MANUAL | | QA/INSPECTIONS<br>---<br><br>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 ENVOKED ON THE SUPPLIER.<br><br>WIRE IS PROCURED TO SPECIFICATION MIL-W-22759 OR MIL-W-81381 AND INSPECTED AND TESTED TO NASA JSCM8080 STANDARD NUMBER 95A.<br><br>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.<br><br>PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE,<br><br>MAGNET WIRE IS PROCURED TO MIL-W-583 AND CHECKED AT INCOMING INSPECTION PER FEDERAL STANDARD J-W-1177 WHICH INCLUDES DIELECTIC, PIN HOLES, BUBBLES, BLISTERS, AND CRACKS IN THE INSULATION.<br><br>ALL SOLDERING IS ACCOMPLISHED BY OPERATORS, WHO ARE TRAINED AND CERTIFIED TO NASA NHB5300.4(3A) STANDARD, AS MODIFIED BY JSC 08800A.<br><br>THE SPRING RETURN MECHANISM IS INSPECTED AND MANUALLY OPERATED IN ACCORDANCE WITH THE REQUIREMENTS OF SPAR-IN.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.<br><br>PRE-ACCEPTANCE TEST INSPECTION, WHICH INCLUDES AN AUDIT OF LOWER TIER INSPECTION COMPLETION, AS BUILT CONFIGURATION VERIFICATION TO AS DESIGN ETC., (MANDATORY INSPECTION POINT).<br><br>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).<br><br>ACCEPTANCE TESTING (ATP) INCLUDES, AMBIENT, VIBRATION AND THERMAL-VAC TESTING, (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT)<br><br>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 |

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## CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
SHEET: 5

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY | RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>---<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>---<br>EE AUTO AND MANUAL | | INCLUDES GROUNDING CHECKS, THRU WIRING CHECKS, WIRING ROUTING, INTERFACE CONNECTORS FOR BENT OR PUSH BACK CONTACTS ETC.<br><br>SRMS SYSTEMS TESTING - STRONGBACK AND FLAT FLOOR AMBIENT PERFORMANCE TEST. (SPAR/GOVERNMENT REP. - MANDATORY INSPECTION POINT) |



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CIL REV: 4

## CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
SHEET: 6

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>---<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>---<br>EE AUTO AND MANUAL | FAILURE HISTORY<br>---<br>THE FOLLOWING FAILURE ANALYSIS REPORT(S) ARE RELEVANT:<br><br>FAR 1001:<br>S/N 201 OCT 80<br><br>DESCRIPTION<br>---<br>SNARE CABLES FAILED TO OPEN COMPLETELY ON BACK-UP RELEASE DURING FLAT FLOOR TEST<br><br>CORRECTIVE ACTION<br>---<br>ECN 51140-2753, 2831, BEARINGS, GEARS CLEANED<br><br>FAR 2372:<br>S/N 303 OCT 83<br><br>DESCRIPTION<br>---<br>SNARE OPEN FLAG FAILED TO OPERATE, SLOW B.U. RELEASE, DESIGN ERROR.<br><br>CORRECTIVE ACTION<br>---<br>ECN'S<br>51140E1471-11-13<br>S1205,S1206 REDUCE DUROID CONTACT AREA.<br><br>FAR 2375:<br>S/N 301 APR 84<br><br>DESCRIPTION<br>---<br>B.U. RELEASE SOLW TO OPERATE, INTERFERENCE OF IDLER GEAR AND INNER CAGE<br><br>CORRECTIVE ACTION<br>---<br>ECN 51140E1472-12 TO PROVIDE MIN. GAP OF CAGE/IDLER GEAR.<br><br>FAR 5002:<br>S/N 202 MAR 79<br><br>DESCRIPTION<br>---<br>WOULD NOT DISENGAGE, DESIGN ERROR, REFER TO FAR 5003.<br><br>CORRECTIVE ACTION<br>---<br>MODIFIED DESIGN<br><br>FAR 5003: |

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## CRITICAL ITEMS LIST

PROJECT: SAMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
SHEET: 7

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>----------<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>----------<br>EE AUTO AND MANUAL | S/N 201 APR 79<br><br>DESCRIPTION<br>----------<br>FAILED TO DISENGAGE, REFER TO FAR 5002<br><br>CORRECTIVE ACTION<br>----------<br>REFER TO FAR 5002<br><br>FAR 5011:<br>S/N 202 NOV 79<br><br>DESCRIPTION<br>----------<br>FAILED TO DESNARE, BACK-UP RELEASE, DESIGN ERRORS<br><br>CORRECTIVE ACTION<br>----------<br>REDISIGN BACK-UP RELEASE MECH<br><br>FAR 5016:<br>S/N 202 OCT 80<br><br>DESCRIPTION<br>----------<br>BACK-UP RELEASE FAILED, DUE TO DESIGN TOLERANCE ERROR, DRY LUBE IN SNARE DRIVE GEAR BOX.<br><br>CORRECTIVE ACTION<br>----------<br>ECN 51140-2822,2823,2823 ,2324,2891 THRU 2894,2923,2924,2925, 2754 THRU 2760<br><br>FAR 5025:<br>S/N 201 MAY 81<br><br>DESCRIPTION<br>----------<br>BACK-UP RELEASE FAILED, DUE TO BACK-UP CLUTCH FAILURE.<br><br>CORRECTIVE ACTION<br>----------<br>ECN 51140 3085 TO WET LUBE CLUTCH REPLACED CLUTCH<br><br>FAR 5026:<br>S/N 202 JUN 81<br><br>DESCRIPTION<br>----------<br>BACK-UP RELEASE FAILED, DEBRIS LODGED IN IDLER BEARING<br><br>CORRECTIVE ACTION<br>----------<br>ECN 2989 REMOVED VESPAL WIPER FROM BALL SCREWS. |

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## CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
SHEET: 8

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>---<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>---<br>EE AUTO AND MANUAL | FAR 5038:<br>S/N 201 DEC 81<br><br>DESCRIPTION<br>---<br>SNARE OPEN FLAG FAILED, BACK-UP RELEASE SPRING JAMMED, POOR WORKMANSHIP<br><br>CORRECTIVE ACTION<br>---<br>ECN 51140D1297-1-02 INSPECTION PORTS IN BACK-UP RELEASE REEL<br><br>FAR 5030:<br>S/N 202 NOV 81<br><br>DESCRIPTION<br>---<br>BACK-UP RELEASE FAILED TEST MOUNTING BLOCKS INTERFERRED<br><br>CORRECTIVE ACTION<br>---<br>REMOVED MOUNTING BLOCKS RETESTED.<br><br>FAR 2411:<br>EE S/N 301 FEB 88<br><br>DESCRIPTION<br>---<br>E/E FAILED TO B/U RELEASE. SPRING KINKED.<br><br>CORRECTIVE ACTION<br>---<br>REDESIGNED SPRING RETURN MECHANISM WITH REVISED GEARING TO REDUCE DRIVE SPRING SPEED BY FACTOR OF 4. |

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# CRITICAL ITEMS LIST

PROJECT: SRMS
ASS'Y NOMENCLATURE: END EFFECTOR
SYSTEM: MECHANICAL ARM SUBSYSTEM
ASS'Y P/N: 51140E1470
SHEET: 9

| FMEA REF. | FMEA REV. | NAME, QTY, & DRAWING REF. DESIGNATION | FAILURE MODE AND CAUSE | FAILURE EFFECT ON END ITEM | HDWR / FUNC. 2/1R CRITICALITY — RATIONALE FOR ACCEPTANCE SCREENS: A-PASS, B-PASS, C-PASS |
|---|---|---|---|---|---|
| 3950 | 4 | BACKUP RELEASE MECHANISM QTY-1 P/N 51140E1472 | MODE: WILL NOT RELEASE.<br><br>CAUSE(S): (1) SHORT OR OPEN CIRCUIT OF BACKUP CLUTCH WINDINGS. (2) SPRING BREAKS. | LOSS OF BACKUP RELEASE.<br><br>WORST CASE<br>---<br>BACK-UP INOPERATIVE.<br><br>REDUNDANT PATHS REMAINING<br>---<br>EE AUTO AND MANUAL | OPERATIONAL EFFECTS<br>---<br>LOSS OF NEXT REDUNDANT PATH RESULTS IN BEING ONE FAILURE AWAY FROM INABILITY TO RELEASE PAYLOAD. ONCE PRIMARY MODES HAVE FAILED, THE BACKUP STANDBY SYSTEM WILL NOT PROVIDE THE CAPABILITY TO RELEASE THE PAYLOAD. EVA RELEASE OF GRAPPLE FIXTURE IS A DESIGN FEATURE. IF THIS IS NOT POSSIBLE PAYLOAD MUST BE JETTISONED WITH ARM.<br><br>CREW ACTION<br>---<br>PERFORM AN EVA TO RELEASE THE PAYLOAD OR JETTISON ARM AND PAYLOAD<br><br>CREW TRAINING<br>---<br>NONE<br><br>MISSION CONSTRAINT<br>---<br>NONE.<br><br>SCREEN FAILURES<br>---<br>B: N/A ( STANDBY REDUNDANT )<br><br>OMRSD OFFLINE<br>---<br>WITH GRAPPLE FIXTURE RIGIDIZED VERIFY BACKUP RELEASE.<br><br>OMRSD ONLINE INSTALLATION<br>---<br>NONE<br><br>OMRSD ONLINE TURNAROUND<br>---<br>WITH GRAPPLE FIXTURE RIGIDIZED VERIFY BACKUP RELEASE. |

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