

CRITICAL ITEMS LIST

PROJECT: SRMS

ASS'Y NOMENCLATURE: DEF RIGIDIZE SENSING G.F.

SYSTEM: PAYLOAD GRAPPLE FIXTURE
ASS'Y P/N: 51404F1

SHEET: 1

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HWR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
10220	3	GRAPPLE SHAFT RETURN SPRING. QTY-1 SPAR 514040109	MODE: SHAFT SEIZED IN RETRACTED POSITION. CAUSE(S): DEBRIS IN SPRING HOUSING.	CARRIAGE WILL NOT REACH FULLY RIGIDIZED POSITION ARM WILL REMAIN LIMPED DURING AUTO CAPTURE. WORST CASE UNEXPECTED MOTION. INCOMPLETE RIGIDIZATION. UNANNUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING N/A		<p>DESIGN FEATURES.</p> <p>.....</p> <p>THE COMPRESSION SPRING P/N 514040109 IS A BOUGHT OUT ITEM. MANUFACTURED FROM SAE 6150 STEEL IN ACCORDANCE WITH ASTM 232 SPECIFICATION. HEAT TREATMENT PER MIL-A-6875, SHOT PEENING PER MIL-F-13165 AND MAGNAFLUX INSPECTION TO MIL-I-6868 ARE OTHER CERTIFICATIONS UNDER WHICH THE SPRING IS PROCURED.</p> <p>PRIOR TO ITS INSTALLATION TO THE GRAPPLE FIXTURE, EACH SHAFT RETURN SPRING IS SUBJECTED TO THE FOLLOWING WORK-IN TESTS UNDER AMBIENT CONDITIONS: 200 COMPRESSION CYCLES AT MAX OPERATION LOADS OF 675 LBF. FOLLOWING INSTALLATION OF THE SHAFT RETURN SPRING INTO THE GRAPPLE FIXTURE, THE FOLLOWING OPERATIONAL ACCEPTANCE TESTING IS CONDUCTED ON THE GRAPPLE FIXTURE. THE SPRING HOUSING P/N 514040106-1 CREATES A CLOSED CAVITY IN WHICH THE SHAFT RETURN SPRING OPERATES. THE RETURN SPRING HOUSING HAS TWO .250 IN. DIA. VENTING HOLES DIAMETRICALLY OPPOSITE TO EACH OTHER. THE GRAPPLE FIXTURE WHEN INTEGRATED WITH THE PAYLOAD IS SUCH THAT THE SPRING HOUSING IS WITHIN THE PAYLOAD STRUCTURE AND THE VENTING HOLES ARE COVERED BY A MICROSWITCH OPERATING CAM SNELL RESULTING IN A RESTRICTED PATH FOR INGRESS OF DEBRIS.</p>

PREPARED BY: NFWG

SUPERSEDING DATE: 30 OCT 86

APPROVED BY: _____

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: LDEF RIGIDIZE SENSING G.F

SYSTEM: PAYLOAD GRAPPLE FIXTURE
 ASS'Y P/N: 51404FT SHEET: 2

P/N & REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	NDR / FDR, I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
10220	3	GRAPPLE SHAFT RETURN SPRING. QTY: 1 SPAR 51404D109	MODE: SHAFT SEIZED IN RETRACTED POSITION. CAUSE(S): DEBRIS IN SPRING HOUSING.	CARRIAGE WILL NOT REACH FULLY RIGIDIZED POSITION ARM WILL REMAIN LIMPED DURING AUTO CAPTURE. WORST CASE UNEXPECTED MOTION, INCOMPLETE RIGIDIZATION, UNANNUNCIATED, CREW ACTION REQUIRED. REDUNDANT PATNS REMAINING N/A	1/1	<p>ACCEPTANCE TESTS THE LDEF RIGIDIZE SENSING GRAPPLE FIXTURE IS SUBJECTED TO THE FOLLOWING ACCEPTANCE TESTS (REF. SPAR-ATP-609) GRAPPLE ONLY.</p> <ul style="list-style-type: none"> D VISUAL INSPECTION AND DIMENSIONAL VERIFICATION D PRE PROOF LOAD INSPECTION D WORK-IN AND INSTALLATION OF THE COMPRESSION SPRING D AMBIENT FUNCTIONAL TESTING D PROOF LOAD TEST: AMBIENT CONDITIONS, BENDING MOMENT = 1200 FT.LBF. CORRESPONDING AXIAL LOAD = 2215 LBF. TORSIONAL LOAD = 450 FT.LBF. D POST PROOF LOAD INSPECTION D VISUAL INSPECTION AND DIMENSIONAL VERIFICATION D AMBIENT FUNCTIONAL D THERMAL ADEQUACY: THERMAL +93 DEGREE C (200 DEGREE F) TO -80 DEGREE C (-112 DEGREE F), TWO CYCLES AMBIENT PRESSURE. <p>OPERATIONAL TESTS ARE CONDUCTED AT THE EXTREMITIES OF THE ABOVE ENVIRONMENT AT THE FOLLOWING OPERATIONAL LOAD. AXIAL GRAPPLE SHAFT LOAD = 700 LBF, MAX.</p> <ul style="list-style-type: none"> D POST THERMAL TEST D VISUAL INSPECTION AND DIMENSIONAL VERIFICATION <p>QUALIFICATION TESTS QUALIFICATION OF THE LDEF (RSBF) IS BY ANALYSIS SEE ANALYSIS REPORT SPAR-RMS-R.624</p> <p>OPERATIONAL TESTS FLIGHT CHECKOUT </p>

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: DEF RIGIDIZE SENSING G.F

SYSTEM: PAYLOAD GRAPPLE FIXTURE
 ASS'Y P/N: 51404F1

SHEET: 3

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOUR / FUNC. 1/1 CRITICALITY RATIONALE FOR ACCEPTANCE
10220	3	GRAPPLE SHAFT RETURN SPRING. QTY-1 SPAR 51404D109	MODE: SHAFT SEIZED IN RETRACTED POSITION. CAUSE(S): DEBRIS IN SPRING HOUSING.	CARRIAGE WILL NOT REACH FULLY RIGIDIZED POSITION ARM WILL REMAIN LIMPED DURING AUTO CAPTURE. WORST CASE ----- UNEXPECTED MOTION. INCOMPLETE RIGIDIZATION. UNANNUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING ----- N/A	QA/INSPECTIONS ----- GRAPPLE FIXTURES ARE MANUFACTURED UNDER DOCUMENTED QUALITY CONTROLS BY A SPAR APPROVED SUBCONTRACTOR. THESE CONTROLS ARE EXERCISED THROUGH DESIGN PROCUREMENT, PLANNING, PROCESSING, FABRICATION, ASSEMBLY, TESTING, SHIPPING AND RECEIVING OF UNITS. SPAR/GOVERNMENT REPRESENTATIVE MANDATORY INSPECTION POINTS ARE ENVOCKED ON THE SUBCONTRACTOR AT VARIOUS LEVELS OF ASSEMBLY AND TESTING. RECEIVING INSPECTION VERIFIES THAT ALL PARTS RECEIVED ARE AS IDENTIFIED IN THE PROCUREMENT DOCUMENTS, THAT NO PHYSICAL DAMAGE TO PARTS HAS OCCURRED DURING SHIPMENT AND THAT APPROPRIATE DATA HAS BEEN RECEIVED WHICH PROVIDES ADEQUATE TRACEABILITY INFORMATION AND IDENTIFIES ACCEPTABLE PARTS. PARTS ARE INSPECTED THROUGHOUT MANUFACTURE, ASSEMBLY AND TEST AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE: INSPECTION VERIFIES THAT KITTED PARTS ARE CORRECT PRIOR TO ASSEMBLY AND TRACEABILITY INFORMATION RECORDED. INSPECTION TO DRAWING IS CONDUCTED THROUGHOUT THE ASSEMBLY PROCESS, INCLUDING INSPECTION OF LOCKING, WITNESSING OF TORQUING AND APPLICATION OF TORQUE STRIPING. VISUAL INSPECTION AND CRITICAL DIMENSIONAL VERIFICATION IS PERFORMED TO SPAR INSPECTION TEST PROCEDURE SPAR-RMS-ITP 306 WHICH INCLUDES GROUNDING VERIFICATION, WORKMANSHIP, DIMENSIONAL, WEIGHT, (SPAR/GOVERNMENT REP.-MANDATORY INSPECTION POINT) ACCEPTANCE TESTING (ATP) INCLUDES DIMENSIONAL CHECKS, BREAKOUT AND RUNNING TORQUES, WITHDRAWAL AND INSERTION LOADS, PROOF LOADING, FUNCTIONAL TESTING AND GROUNDING TEST. (SPAR/GOVERNMENT REP.- MANDATORY INSPECTION POINT).

PREPARED BY: NFWG

SUPPLEMENTING DATE: 30 OCT 86

APPROVED BY: _____

DATE: _____

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: LDEF RIGIDIZE SENSING G.F

SYSTEM: PAYLOAD GRAPPLE FIXTURE
 ASS'Y P/N: 51404F1

SHEET: 5

P/N & REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT OR END ITEM	HWR / FURC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
10220	3	GRAPPLE SHAFT RETURN SPRING. QTY-1 SPAR 51404D109	MODE: SHAFT SEIZED IN RETRACTED POSITION. CAUSE(S): DEBITS IN SPRING HOUSING.	CARRIAGE WILL NOT REACH FULLY RIGIDIZED POSITION ARM WILL REMAIN LIMPED DURING AUTO CAPTURE. WORST CASE UNEXPECTED MOTION. INCOMPLETE RIGIDIZATION. UNANNOUNCED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING N/A	FAILURE HISTORY NONE	

CRITICAL ITEMS LIST

PROJECT: SRMS
 ASS'Y NOMENCLATURE: DEF RIGIDIZE SENSING G.F.

SYSTEM: PAYLOAD GRAPPLE FIXTURE
 ASS'Y P/N: 51404FT SHEET: 5

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	MODE / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
10220	3	GRAPPLE SHAFT RETURN SPRING. QTY-1 SPAR 51404D109	MODE: SHAFT SEIZED IN RETRACTED POSITION. CAUSE(S): DEBRIS IN SPRING HOUSING.	CARRIAGE WILL NOT REACH FULLY RIGIDIZED POSITION ARM WILL REMAIN LIMPED DURING AUTO CAPTURE. WORST CASE UNEXPECTED MOTION. INCOMPLETE RIGIDIZATION. UNANNUNCIATED. CREW ACTION REQUIRED. REDUNDANT PATHS REMAINING N/A		<p>OPERATIONAL EFFECTS -----</p> <p>UNABLE TO FULLY RIGIDIZE PAYLOAD ARM WILL REMAIN LIMP IF IN AUTO MODE. OPERATOR WILL DETECT OFF NOMINAL OPERATION OF THE EE.</p> <p>CREW ACTION -----</p> <p>THE EE NODE SWITCH SHOULD BE TURNED OFF. CREW SHOULD OBSERVE THE CAPTURE SEQUENCE AND DETERMINE THAT THE GRAPPLE FIXTURE HAS BEEN DRAWN FAR ENOUGH INTO THE EE TO PROHIBIT PAYLOAD ROTATIONS. IF THE INTERFACE DOES NOT APPEAR RIGID, ATTEMPT TO RIGIDIZE IN THE ALTERNATE MODE. IF RIGIDIZE IS UNSUCCESSFUL, ATTEMPT TO RELEASE USING A PRIMARY EE MODE. IF SHARES DON'T OPEN, ATTEMPT TO RELEASE IN BACK-UP MODE. IF SHARES OPEN, MANEUVER ARM AWAY FROM THE PAYLOAD AND GRAPPLE ALTERNATE G. IF GRAPPLE FIXTURE, IF SHARES CANNOT BE OPENED IN ANY MODE, THEN THE ARM/PAYLOAD COMBINATION CAN BE JETTISONED.</p> <p>CREW TRAINING -----</p> <p>CREW TO BE TRAINED TO RECOGNIZE OFF NOMINAL OPERATION OF THE EE AND TO TURN MODE SWITCH TO OFF AFTER SPEC TIME AND 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.</p> <p>SCREEN FAILURES -----</p> <p>N/A</p>

PREPARED BY: MING

SUPPLEMENTING DATE: 30 OCT 86

APPROVED BY: _____

DATE: _____