CRITICAL ITEMS LIST

PROJECT: CARGO ELEMENT INTERFACE
ASSEMBLY: ELECTRICAL FLIGHT GRAPPLE FIXTURE

SYSTEM:
PAYLOAD GRAPPLE FIXTURE
ASSEMBLY NUMBER:
SI597E100-1

ITEM REF.	REV	NAME, QTY & DRAWING REF DESIGNATION	FUNCTION	FAILURE MODE & CAUSE	MISSION PHASE	FAILURE EFFECT ON END ITEM	HARDWARE FUNCTION CRITICALITY	RATIONALE FOR ACCEPTANCE
1)	B	LEVER SLIDE, SPHERICAL PIN SHAFT ASSEMBLY QTY-1 P/N SPAR S1597D158-1 QTY-1 P/N SPAR S1597C124-1 QTY-1 P/N SPAR NAS1121E8	PROVIDES MECHANICAL INTERFACE TO ENGAGE OBJECT PAYLOAD ELECTRICAL CONNECTORS	MODE: TELESCOPIC SHAFT ASSEMBLY SEIZING CAUSE(S): DEBRIS IN TELESCOPIC INTERFACES OR SEIZED LEVER SLIDE SCREW	ORBIT	1) SEIZED EXTENDED: ADDITIONAL STRESS ON LEVER IMMEDIATE CONNECTOR MOTION. 2) SEIZED RETRACTED (OR NOT EXTENDED): MAY LOSE ELECTRICAL CONTINUITY ACROSS CONNECTOR DURING LOADING CONDITIONS. **WORST CASE** SR CARRIAGE DOES NOT REACH FULLY RETRACTED POSITION. POSSIBLE DAMAGE TO EE DUE TO MOTOR BURNOUT IF NO MISS FLAG, OR IF CONNECTOR FULLY EXTENDED ON SUBSEQUENT CAPTURE. **TIME TO EFFECT** SECONDS **REDUNDANT PATHS REMAINING** NA	1/2	**DESIGN FEATURES** THE TELESCOPIC SHAFT ASSEMBLY CONSISTS OF A SPHERICAL PIN, PART NUMBER S1597C124-1, SLIDING INTO THE CAVITY OF THE LEVER SLIDE, PART NUMBER S1597D158-1. THESE PARTS ARE MANUFACTURED FROM CORROSION RESISTANT STEEL PER AMS5617, CONDITION 455, GRADE 1. THEY ARE DRY FILM LUBRICATED WITH SANOSTROM 8A PER MIL-L-46010. THE TWO PARTS ARE LINKED BY A RETAINING SCREW, 1/2-32 UNC-3A, PART NUMBER NAS1121E8. THIS IS A CROWNED OUT PART MANUFACTURED FROM 160 KSI CORROSION RESISTANT STEEL PER AMS5737 (A286). THE TELESCOPIC INTERFACES ARE DESIGNED TO PROVIDE A RESTRICTED PATH FOR THE INGRESS OF DEBRIS. REFERENCE DESIGN ANALYSIS REPORT SPAR-RMS-RL1998 FOR ERDF MARGINS OF SAFETY. SUBSEQUENT TO INSTALLATION OF THIS PART INTO THE ERDF, THE FOLLOWING ACCEPTANCE TESTING IS CONDUCTED ON THE GRAPPLE FIXTURE. THE EXTENSION AND RETRACTION OF THE TELESCOPIC SHAFT ASSEMBLY IS EXTENSIVELY EXERCISED DURING THE COURSE OF THIS TESTING. **ACCEPTANCE TESTS** THE ELECTRICAL FLIGHT GRAPPLE FIXTURE (EFGF) IS SUBJECTED TO THE FOLLOWING ACCEPTANCE TESTS (REF. SPAR-RMS ATP 1073): - VISUAL INSPECTION AND CRITICAL DIMENSION VERIFICATION - AMBIENT FUNCTIONAL TESTS: A) MECHANICAL - GRAPPLE SHAFT OPERATION, ELECTRICAL CONNECTOR MATE/DEMATE, AND EVA SHAFT RELEASE/INSERTION, UNDER LOAD AND NO LOAD. B) ELECTRICAL - CONTINUITY, ISOLATION RESISTANCE, DIELECTRIC STRENGTH UNDER 0 AND 3 DEG. X AND Y AXIS SEPARATION. - VIBRATION TEST: 0.04 g^2/Hz IN EACH OF X, Y, AND Z AXIS - VISUAL INSPECTION - STRUCTURAL ADEQUACY TEST: - AXIAL LOAD = 2215 LBF. - BENDING MOMENT = 1300 FT-LBS. - TORSIONAL MOMENT = 450 FT-LBS. - VISUAL INSPECTION AND CRITICAL DIMENSIONS VERIFICATION - AMBIENT FUNCTIONAL TESTING - MECHANICAL - THERMAL TEST - + 54 DEG. C, -61 DEG. C, TWO CYCLES MECHANICAL FUNCTION TESTED AT TEMPERATURE EXTREMES. - FUNCTIONAL TESTING - MECHANICAL AND ELECTRICAL

PREPARED BY: LIA APPROVED BY: FMEA/CIL Working group DATE: 8 Jun 92 SUPERCEDING DATE:

ICAL ITEMS LIST

PROJECT: DRAGO ELEMENT INTERFACE
ASSEMBLY: ELECTRICAL FLUID GRAPPLE FIXTURE

ITEM	REV	NOMENCLATURE OR DRAWING REF DESIGNATION	FUNCTION	FAILURE MODE & CAUSE	MISSION PHASE	FAILURE EFFECT ON END ITEM	HARDWARE FUNCTION CRITICALITY

NTINUED

SYSTEM:
PAYLOAD GRAPPLE FIXTURE
ASSEMBLY NUMBER:
11597EF00-1

RATIONALE FOR ACCEPTANCE

QUALIFICATION TESTS

THE EFOF QUALIFICATION CONSISTED OF PERFORMING ESSENTIALLY THE SAME TESTS AS REQUIRED FOR ACCEPTANCE, PLUS THE FOLLOWING ADDITIONAL TESTS WITH THEIR ASSOCIATED MECHANICAL AND ELECTRICAL FUNCTIONAL INSPECTIONS (REF. SPAR-RMS-TP-1074):

- STRUCTURAL ADEQUACY TEST:
- ATP REPEATED USING 1.25 DESIGN LOAD AND MOMENT VALUES.

- THERMAL VACUUM TEST:
- +90 DEG C/-75 DEG. C, TEN CYCLES
- MECHANICAL FUNCTION TESTED AT TEMPERATURE EXTREMES

- VIBRATION TEST:
- RESONANCE EVALUATION AT 0.5 g
- 0.067 g^2/Hz IN EACH OF X, Y, AND Z AXIS

QA INSPECTIONS

THE EFOF IS MANUFACTURED UNDER DOCUMENTED QUALITY CONTROLS BY SPAR AND APPROVED SUBCONTRACTORS. THESE CONTROLS ARE EXERCISED THROUGH DESIGN, PROCUREMENT, PROCESSING, FABRICATION, ASSEMBLY, TESTING, SHIPPING AND RECEIVING OF UNITS. SPAR/GOVERNMENT REPRESENTATIVE MANDATORY INSPECTION POINTS ARE INVOKED 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:

VERIFICATION THAT KITTED PARTS ARE CORRECT PRIOR TO ASSEMBLY AND TRACEABILITY INFORMATION RECORDED.

INSPECTION TO DRAWING 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-1072, WHICH INCLUDES GROUNDING VERIFICATION, WORKMANSHIP, DIMENSIONAL, WEIGHT, (SPAR/GOVERNMENT REP. MANDATORY INSPECTION POINT).

ACCEPTANCE TESTING (ATP) INCLUDES CRITICAL DIMENSIONAL CHECKS, FUNCTIONAL TESTING FOR GRAPPLE SHAFT OPERATION, ELECTRICAL CONTINUITY AND ELECTRICAL OPERATION, BREAKOUT AND RUNNING TORQUES FOR EVA SHAFT WITHDRAWAL AND INSERTION UNDER LOAD, PROOF LOADING AND GROUNDING TEST. (SPAR/GOVERNMENT REP. MANDATORY INSPECTION POINT).

PARED BY: JJB APPROVED BY: FMEA/CIL Working Group DATE: 8 Jun 92 SUPERCEDING DATE:

CRITICAL ITEMS LIST

PROJECT: CARGO ELEMENT INTERFACE ASSEMBLY ELECTRICAL FLIGHT GRAPPLE FIXTURE

SYSTEM
PAYLOAD GRAPPLE FIXTURE
ASSEMBLY NUMBER:
[illegible]

AEA REF.	REV	NAME, QTY & DRAWING REF DESIGNATION	FUNCTION	FAILURE MODE & CAUSE	MISSION PHASE	FAILURE EFFECT ON END ITEM	HARDWARE FUNCTION CRITICALITY	RATIONALE FOR ACCEPTANCE
1068 CONTINUED								

DMRS:

NONE

FAILURE HISTORY

NONE

OPERATIONAL EFFECTS

MAY NOT BE ABLE TO SECURE EE TO PAYLOAD.

CREW ACTION

MANOEUVRE ARM AND ORBITER AWAY FROM PAYLOAD.

CREW TRAINING

THE CREW WILL BE TRAINED TO MANOEUVRE THE ORBITER AWAY FROM A FREE FLYING PAYLOAD AT ANY TIME DURING ARM OPERATIONS

MISSION CONSTRAINTS

OPERATE UNDER VERNIER RATES WITHIN 10 FT. OF STRUCTURE. THE ARM WILL NOT BE DRIVEN UNLESS THE CREW IS OBSERVING THE EXPECTED MOTION OF THE ARM/payload STRUCTURE VIA WINDOW AND/OR CCTV VIEWS.

EE MODE SWITCH SET TO OFF POSITION IMMEDIATELY AFTER SPECIFIED DRIVE TIME HAS ELAPSED

WHEN CAPTURING OR RELEASING A FREE FLYING PAYLOAD, THE EE MUST BE FAR ENOUGH AWAY FROM STRUCTURE TO PREVENT CONTACT REGARDLESS OF PAYLOAD ROTATIONS.

FMEA/CIL 8 Jun 92