

**CRITICAL ITEMS LIST**

PROJECT: SRMS  
 ASS'Y NOMENCLATURE: TPAD FLIGHT RELEASABLE GF

SYSTEM: PAYLOAD GRAPPLE FIXTURE  
 ASS'Y P/N: 51475E101 SHEET: 1

PNEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HWR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
10130	1	GRAPPLE TIP RETAINING ASSEMBLY QTY-1 P/N MAS 1134E2	MODE: LOSS OF EE RIGIDIZE FORCE.  CAUSE(S): FAILURE OF TIP RETAINING SCREW OR INSERT.	PAYLOAD RELEASED.  WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING ----- N/A	DESIGN FEATURES -----	THE GRAPPLE TIP RETAINING SCREW .250-2B UNF-3A P/N MAS 1134E2 IS A BOUGHT OUT PART AND MANUFACTURED FROM 160-180 KSI CORROSION RESISTANT STEEL PER AMS 5737 (A286). THE INTERNAL LOCKING HELICOIL INSERT P/N MS 21209-F4-10L IS A BOUGHT OUT PART AND MANUFACTURED FROM CORROSION RESISTANT STEEL MIL-1-6846. THE THREADS OF THE INSERT ARE DRY FILM LUBRICATED PER MIL-L-8937 TO PREVENT GALLING OF THE RETAINING SCREW THREADS. REF. TABLE 16 FOR FRGF MARGINS OF SAFETY.

PREPARED BY: MFHG

SUPERSEDING DATE: 30 OCT 86

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

DATE: \_\_\_\_\_

GF-32

**CRITICAL ITEMS LIST**

PROJECT: SRMS

SYSTEM: PAYLOAD GRAPPLE FIXTURE

ASS'Y NOMENCLATURE: TPAU FLIGHT RELEASABLE CF

ASS'Y P/N: 51475E101

SHEET: 2

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	NDR / FUNC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
10130	1	GRAPPLE TIP RETAINING ASSEMBLY QTY-1 P/W HAS 1134E2	<p>MODE: LOSS OF EE RIGIDIZE FORCE.</p> <p>CAUSE(S): FAILURE OF TIP RETAINING SCREW OR INSERT.</p>	<p>PAYLOAD RELEASED.</p> <p>WORST CASE</p> <p>UNCOMMANDED RELEASE. CREW ACTION REQUIRED.</p> <p>REDUNDANT PATHS REMAINING</p> <p>N/A</p>	ACCEPTANCE TESTS	<p>-----</p> <p>o VISUAL INSPECTION AND DIMENSIONAL VERIFICATION</p> <p>o PROOF LOAD TEST:</p> <p>-----</p> <p>THE FOLLOWING ACCEPTANCE LOAD TEST IS CONDUCTED ON ALL FLIGHT UNITS UNDER AMBIENT CONDITIONS. THIS TEST VERIFIES THE INTEGRITY OF THE GRAPPLE TIP ASSEMBLY, RETAINING SCREW AT DESIGN LIMIT LOAD. GRAPPLE SHAFT AXIAL LOAD = 2215 LBF. (RESULTING FROM 1200 FT.LBF. BENDING MOMENT.</p> <p>o DIMENSIONAL VERIFICATION (POST PROOF LOAD)</p> <p>-----</p> <p>QUAL TEST</p> <p>-----</p> <p>NONE BY SPAR</p> <p>AMBIENT OPERATIONAL TESTS</p> <p>-----</p> <p>FLIGHT CHECKOUT</p> <p>-----</p>

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PROJECT: SRMS  
 ASS'Y NOMENCLATURE: PAD FLIGHT RELEASABLE GF

SYSTEM: PAYLOAD GRAPPLE FIXTURE  
 ASS'Y P/N: 51475E101 SHEET: 3

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HOMR / FUNC. I/I CRITICALITY	RATIONALE FOR ACCEPTANCE
10130	1	GRAPPLE TIP RETAINING ASSEMBLY QTY-1 P/M NAS 1134E2	MODE: LOSS OF EE RIGIDIZE FORCE.  CAUSE(S): FAILURE OF TIP RETAINING SCREW ON INSERT.	PAYLOAD RELEASED.  WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING ----- N/A	QA/INSPECTIONS -----	<p>GRAPPLE FEATURES 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 ENVOYED ON THE SUBCONTRACTOR AT VARIOUS LEVELS OF ASSEMBLY AND TESTING.</p> <p>THE GRAPPLE TIP RETAINING SCREW PART NO. NAS1134E2 IS A STANDARD .25 .250-28UNF3A PAN HEAD TORQUE SCREW PROCURED TO NASA SPEC NAS-1134.</p> <p>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.</p> <p>PARTS ARE INSPECTED THROUGHOUT MANUFACTURE, ASSEMBLY AND TEST AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE:</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>VISUAL INSPECTION AND CRITICAL DIMENSIONAL VERIFICATION IS PERFORMED TO SPAR INSPECTION TEST PROCEDURE SPAR-RMS-ITP 306 WHICH INCLUDES GRINDING VERIFICATION, WORKMANSHIP, DIMENSIONAL, WEIGHT, (SPAR/GOVERNMENT REP. MANDATORY INSPECTION POINT)</p>

*GP-34*

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PROJECT: SRMS

SYSTEM: PAYLOAD GRAPPLE FIXTURE

ASS'Y NOMENCLATURE: TPAD FLIGHT RELEASABLE GF

ASS'Y P/N: 51475E101

SHEET: 6

FMEA REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HWR / FIRC. 1/1 CRITICALITY	RATIONALE FOR ACCEPTANCE
10130	1	GRAPPLE TIP RETAINING ASSEMBLY QTY-1 P/N WAS 1134E2	MODE: LOSS OF EE RIGIDIZE FORCE.  CAUSE(S): FAILURE OF TIP RETAINING SCREW OR INSERT.	PAYLOAD RELEASED.  WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING ----- N/A	FAILURE HISTORY ----- NONE	

PREPARED BY: MEMG

SUPERSEDING DATE: 30 OCT 86

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

DATE: \_\_\_\_\_

**CRITICAL ITEMS LIST**

PROJECT: SBNS  
 ASS'Y NOMENCLATURE: TPAD FLIGHT RELEASABLE OF

SYSTEM: PAYLOAD GRAPPLE FIXTURE  
 ASS'Y P/N: 51475E101

SHEET: 5

P/N REF.	REV.	NAME, QTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	IDNR / FUMC. I/F CRITICALITY	RATIONALE FOR ACCEPTANCE
10130	1	GRAPPLE TIP RETAINING ASSEMBLY QTY-1 P/N HAS 1134E2	MODE: LOSS OF EE RIGIDIZE FORCE.  CAUSE(S): FAILURE OF TIP RETAINING SCREW OR INSERT.	PAYLOAD RELEASED.  WORST CASE UNCOMMANDED RELEASE. CREW ACTION REQUIRED.  REDUNDANT PATHS REMAINING N/A		OPERATIONAL EFFECTS ----- PAYLOAD WILL BE RELEASED WITHOUT AN OPERATOR COMMAND. UNCOMMANDED RELEASE WILL BE ANNUNCIATED. 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 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 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

PREPARED BY: NIWG

SUPERSEDING DATE: 30 OCT 86

APPROVED BY:

DATE:

9F-36