

SRB CRITICAL ITEMS LIST

SUBSYSTEM: RANGE SAFETY COMMAND DESTRUCT

ITEM NAME: Linear Shaped Charge FM CODE: A01

PART NO.: 10313-0002-801, 10313-0003-801, 10313-0003-802  
10313-0004-801, 10313-0004-802, 10313-0012-801, 10313-0012-802,  
10313-0013-801, 10313-0013-802, 10313-0013-803, 10313-0014-801

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ITEM CODE: 70-16 REVISION: Basic

CRITICALITY CATEGORY: 1 REACTION TIME: Immediate

NO. REQUIRED: 1 DATE: March 31, 1999

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CRITICAL PHASE: Boost SUPERCEDES: March 31, 1998

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FMEA PAGE NO.: F-58 ANALYST: S. Roney

SHEET 1 OF 5 APPROVED: P. Kalia

FAILURE MODE AND CAUSES: Fails to operate caused by:

- Insensitive explosive in LSC or transfer booster degraded by moisture, contamination or chemical decomposition
- Voids or cracks in LSC
- Wrong chevron angle on LSC
- Improper standoff or orientation of LSC with material to be cut: chevron shape of LSC deformed
- Insufficient charge in LSC or transfer booster
- Improper standoff between transfer booster and LSC or between CDF and transfer booster.

FAILURE EFFECT SUMMARY: Failure of linear shaped charge to detonate during boost results in the loss of the ability to destruct the SRB which may result in loss of life and/or injury to the public or ground personnel.

RATIONALE FOR RETENTION:

A. DESIGN

- Design Specification 10SPC-0037
  - Standoff and orientation per paragraph 3.3.2. (Improper Standoff)
  - Contamination control per paragraphs 3.1.2 and 3.1.3. (Contamination)

- O Explosive Material: (Contamination)
  - o HMX certified to Grade B, Class 1, per MIL-H-45444 (LSC).
  - o RDX certified to Type II, Class 3, per MIL-R-398 (Transfer Booster).
- O Hermetically sealed device prevents the entry of contamination following manufacturing.
- O Shelf life is controlled by flight certificates per USBI Flight Certification Plan 10PLN-0037. (Insensitive Explosive)
- O Qualification
  - o 8 foot drop (cracks)
  - o Vibration test (Vibration, voids, cracks)
  - o Temperature-Humidity-Altitude test. (insensitive explosive)
  - o Low (20°F) and high (200°F) temperature functional test. (All Failure Causes)
  - o Helium leak test. (Contamination)
  - o Qualification per Explosive Technology Test Reports 3653(01)RQTR, Rev. B, 4249(01)DQTR, 4984(01) DQTR, 0954(01)DQTR and 10135(01) DQTR. (COQ A-PYR-6111-4)

**B. TESTING**

- O Lot acceptance test per OEA Aerospace Procedure 4984(02)ATP
  - o Helium leak test performed on LSC and transfer boosters of entire lot. (Contamination)
  - o X-ray inspection performed on end bushings of entire lot. (Contamination) (Improper Standoff Between Charges, Voids, Cracks)
  - o N-ray inspection performed on CDF/LSC connectors of entire lot. (Contamination, Insufficient Charge)
  - o Temperature-Humidity-Altitude test performed on ten percent of the lot of destruct assemblies. (Insensitive Explosive, Moisture, Voids, Cracks)
  - o Low temperature function test of five percent of the lot of destruct assemblies. (All Failure Causes)
  - o Vibration test of ten percent of the lot of destruct assemblies. (Cracks, Voids)
  - o High temperature function test of five percent of the lot of destruct assemblies. (All Failure Causes)
- O LSC cord level test conducted in accordance with OEA Aerospace Procedure 4984(02) ATP includes the following:
  - o Moisture content 30 days prior to loading. (Contamination)
  - o Detonation velocity and severance tests. (All Failure Causes)
  - o Core load determination. (Insufficient Charge)
  - o Visual inspection. (Contamination, Improper Orientation)

- o Dimensional inspection of base width, height, length, thickness and symmetry of LSC. (Deformed Chevron)
- o X-ray inspection. (Contamination, Cracks, Voids)
- o Transfer booster LAT in accordance with OEA Aerospace Procedure 4984(02)ATP includes the following: (All Failure Causes)
  - o Dent output firings of ten percent of the lot. (All Failure Causes)
  - o Visual inspection. (Contamination)
  - o Helium leak test. (Contamination)
  - o N-ray inspection. (Contamination, Insufficient Charge)
  - o Assembly weight. (Insufficient Charge)

## C. INSPECTION

## VENDOR RELATED INSPECTION

- o Receiving Inspection: All explosive material certifications and test reports are verified one hundred percent by USBI Quality Assurance and Contractor Quality Assurance per: (Contamination)
  - o USBI Quality Assurance  
USBI SIP 1138
  - o Contractor Quality Assurance  
OEA Aerospace Acceptance Test Procedure 4984(02) ATP
- o Assembly Operation (LSC and Transfer Booster): N-Ray and X-ray films are inspected one hundred percent by certified vendor personnel and verified by USBI personnel. LSC Apex angle is inspected one hundred percent by USBI Quality Assurance and Contractor Quality Assurance. Helium leak test is witnessed one hundred percent by USBI Quality Assurance and Contractor Quality Assurance per: (Contamination, Cracks, Voids, Insufficient Charge)
  - o USBI Quality Assurance
    - USBI SIP 1138
  - o Contractor Quality Assurance
    - OEA Aerospace Acceptance Test Procedure 4984(02)ATP

- Lot Acceptance Test (Components): X-ray and N-ray films are inspected by certified vendor personnel and verified by USBI personnel. Moisture content determination, core load determination test data, dent output and assembly weight of transfer booster are verified one hundred percent by Contractor Quality Assurance and USBI Quality Assurance. Detonation velocity and severance test are witnessed one hundred percent by USBI Quality Assurance and Contractor Quality Assurance per: (All Failure Causes)
  - USBI Quality Assurance
    - USBI SIP 1138
  - Contractor Quality Assurance
    - OEA Aerospace Acceptance Test Procedure 4984(02) ATP
- Lot Acceptance Test (RSS Destruct Assemblies): X-ray and N-ray films are inspected by certified vendor personnel and verified by USBI personnel. Helium leak test is witnessed one hundred percent by USBI and Contractor Quality Assurance per: (All Failure Causes)
  - USBI Quality Assurance
    - USBI SIP 1138
  - Contractor Quality Assurance
    - OEA Aerospace Acceptance Test Procedure 4984(02) ATP
- Lot Review and Certification per USBI plan 10PLN-0037.
- Critical Processes/Inspections/Operations: The following critical processes/inspections/ operations are used to verify that LSC is free from cracks, separation, voids, moisture and contamination.
  - X-ray per ET 4984(02) ATP
  - N-ray per ET 4984(02) ATP
  - Helium Leak Test per ET 4984(02) ATP
  - Adhesive Application per ET 4984(21) MP
  - Nickel Seal Welded Per OEAA Standard 3.3.8-3 Laser Beam Welding

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## KSC RELATED INSPECTION

- Receiving Inspection
  - Shelf life of LSC destruct assembly is verified one hundred percent by SPC Quality Assurance. (Insensitive Explosive)
  - Each LSC destruct assembly is visually inspected for evidence of damage, degradation, corrosion, misalignment or moisture per OMRSD File V, Vol. 1, requirement number B000FL.005. (Contamination)
- Installation Inspection
  - Installation of LSC subassemblies into systems tunnel is witnessed by SPC Quality Assurance. (Contamination, Improper Standoff)

D. FAILURE HISTORY

o Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

o Not applicable to this failure mode.