

SRB CRITICAL ITEMS LIST

SUBSYSTEM: RANGE SAFETY COMMAND DESTRUCT

ITEM NAME: Confined Detonating Fuse (CDF) Assembly

PART NO.: 10314-0001-123 through
-129 and-136 through -143
10315-0002-826 (alternate)
10314-0002-825, 10315-0001-832,
10315-0002-834, 10315-0003-835
FM CODE: A02

ITEM CODE: 70-14 REVISION: Basic

CRITICALITY CATEGORY: 1R REACTION TIME: Immediate

NO. REQUIRED: 2 DATE: March 1, 2001

CRITICAL PHASES: Boost SUPERCEDES: March 31, 1999 CN 042

FMEA PAGE NO.: F-52 ANALYST: K. C. Finch /S. Parvathaneni CN 042

SHEET 1 OF 4 APPROVED: S. Parvathaneni CN 042

FAILURE MODE AND CAUSES: Fails to operate (both CDF Assemblies) caused by:

- o Insensitive explosive degraded by moisture, contamination or chemical decomposition
- o Voids or cracks in the explosive cord
- o Improper gap at external interface
- o Contamination or excessive gap at internal interfaces
- o Overheating of charge
- o Vibration/shock

FAILURE EFFECT SUMMARY: Failure of both CDF assemblies to operate leads to loss of the ability to detonate the destruct ordnance during the boost phase which may result in the loss of life and/or injury to the public or ground personnel.

REDUNDANCY SCREENS AND MEASUREMENTS:

- 1) N/A
- 2) N/A
- 3) Pass- No known common cause.

RATIONALE FOR RETENTION:

A. DESIGN

O Design specification USA SRBE 10SPC-0035

- o Contamination control per paragraphs 3.1.2 and 3.1.3. (Insensitive Explosive)
 - o No autoignition below 275°F, paragraph 3.3.7.1
 - o Transportation and Storage Temperatures per paragraphs 3.4.3.3 and 3.4.3.4 (Overheating of Charge)
- O Predicted temperature after installation will not exceed +172°F per SRB Thermal Design Data Book SE-019-068-2H, Rev. C, Table 4.9.1.1. (Overheating of Charge)
- o P/N 10314-0002 explosive material (PETN) certified to MIL-H-387C (Contamination) CN 042
 - o P/N 10315-0002 (Ensign Bickford) explosive material (PETN) TIP certified to MIL-H-387C and (HMX) cord certified to MIL-H-45444B or P/N 10315-0001 (Teledyne McCormick Selph) explosive material (PETN) TIP certified to MIL-H-387C and (HNS) cord certified to WS5003F or P/N 10315-0003 (OEA Aerospace) explosive material (PETN) tip certified to MIL-H-387C and (HNS) cord certified to WS5003F. (Contamination) CN 042
- O Sealed device prevents the entry of contamination following manufacturing. (Insensitive explosive)
- O Qualification
- o Proven design qualified for Saturn V per North American Aviation Qualification Test Summary 67MS1149.
 - o Delta Qualification for SRB.
 - 8 and 40 foot drop. (Vibration/Shock)
 - Vibration (Vibration)
 - Operating high temperature (250°F for 30 minutes). (Overheating of Charge)
 - Pyro shock (Shock)
 - o Delta qualification per Ensign Bickford Test Reports 5860A, for the PETN Cord CDF Assembly and EB Test Reports 86-08-03, 87-1435; DEN for the HMX Cord CDF Assembly and Teledyne McCormick Selph Test Report QTR 7786-324A for the HNS Cord CDF Assembly or OEA Aerospace test report 11914(01) qtr. Rev. A for HNS Cord CDF Assembly..

B. TESTING

- O Lot acceptance test per Ensign Bickford Procedure ATP 0030/2 (PETN-Cord) or ATP0030/5 (HMX-Cord) or TMcS ATP 817296 or OEA Aerospace ATP 11914(01) HNS Cord.
- o Radiographic examination of entire lot. (Voids, Cracks, Improper Gaps)
 - o Vibration tests of all destructive LAT samples. (Vibration)
 - o Temperature/humidity/altitude test of all destructive LAT samples. (Insensitive explosive due to contamination)
 - o Low temperature (-150°F) function five percent of the lot. (All Failure Causes)
 - o High temperature (+250°F) function test of five percent of the lot. (All Failure Causes)

C. INSPECTION

The following inspections are performed.

VENDOR RELATED INSPECTIONS

- O Receiving inspection. All explosive material certifications and test reports are verified one hundred percent.
 - o USA SRBE Quality Assurance
USA SRBE Source Inspection Plan (SIP) 1149 for (PETN)-Cord, (HMX)-Cord and (HNS)-Cord.
 - o Contractor Quality Assurance
Ensign Bickford Inspection Procedure QA 461/2 for the (PETN)-Cord
Ensign Bickford Inspection Procedure QA 461/3 for the (HMX)-Cord
TMcS Assembly and Inspection Procedure 817296 for the (HNS)-Cord
OEA Aerospace Receiving Inspection Plan 11914(01) RIP for HNS Cord CDF Assembly
- O Assembly operation: Moisture content determination and explosive loading are verified one hundred percent by Contractor Quality Assurance and USA SRBE Quality Assurance. Mass ration determination for 10315-0001 and fill density determination for 10314/10315-002 are verified by Contractor Quality Assurance and USA SRBE Quality Assurance. For OEA Aerospace CDF assemblies only, the flexibility test is witnessed one hundred percent by Contractor and USA SRBE Quality Assurance. (Contamination)
 - o USA SRBE Quality Assurance
USA SRBE SIP 1149 for the (PETN)-Cord , (HMX)-Cord, and (HNS)-Cord.
 - o Contractor Quality Assurance
Ensign Bickford Inspection Procedure QA 461/2 (PETN-Cord) or QA 0461/3 (HMX-Cord)
Teledyne McCormick Selph Assembly and Inspection Procedure 817296 (HNS-Cord)
OEA Aerospace receiving Inspection Plan 11914 MP (Booster Cup) or 11914(02) HNS Cord
- O Lot Acceptance Test: N-ray and X-ray films are examined by certified vendor personnel and verified by USA SRBE personnel. Vibration test is monitored by USA SRBE Quality Assurance and witnessed by Contractor Quality Assurance. High temperature function test is witnessed one hundred percent. For OEA Aerospace CDF assemblies only, Helium leak test is witnessed one hundred percent by contractor and USA SRBE Quality Assurance. (All Failure Causes)
 - o USA SRBE Quality Assurance
USA SRBE SIP 1149 for the (PETN)-Cord, (HMX)-Cord and (HNS)-Cord
 - o Contractor Quality Assurance
Ensign Bickford Acceptance Test Procedure ATP 0030/2 (PETN-Cord) or ATP 0030/5 (HMX-Cord)
Teledyne McCormick Selph (TMcS) ATP 817296 (HNS-Cord)
OEA Aerospace 11914(01) ATP HNS Cord
- O Lot review and certification per USA SRBE plan 10PLN-0035.

- O Critical Processes/Inspections/Operations: The following critical processes/inspections/ operations are used to assure that explosive charge is properly assembled/sealed. (Voids or Gaps, Improper Gap or Excessive Gap at Internal Interface)
 - o X-ray per EB ATP 0030/2(PETN Cord) or ATP 0030/5 (HMX Cord) or TMcS ATP 817296 (HNS Cord) or OEA Aerospace ATP11914(01) (HNS Cord)
 - o N-ray per EB ATP 0030/2(PETN Cord) or ATP 0030/5 (HMX Cord) or TMcS ATP 817296 (HNS Cord) or OEA Aerospace ATP 11914(01) (HNS Cord).
 - o Adhesive application per EB Inspection Procedure QA 461/2 (PETN Cord) or QA 461/3 (HMX Cord) or TMcS Assembly and Inspection Procedure 817296 (HNS Cord) or OEA Aerospace manufacturing procedure 11914(01) MP.

KSC RELATED INSPECTION

- O Receiving Inspection
 - o Each non-electric pyrotechnic device is visually inspected for evidence of damage, degradation, corrosion, misalignment, or moisture per OMRSD File V, Vol. 1, requirement number B000FL.005. (Contamination)
 - o Ordnance device shelf life is verified 100% by Shuttle Processing Contractor Quality Assurance per OMRSD File II, Vol. 3 Table C00CA0.040-000. (Contamination, Insensitive Explosive).
 - o Verify that CDF Assemblies Certification per OMRSD File V, Vol. I, requirement number B000FL.002. (All Failures Causes)

- O Installation Inspections (Contamination)
 - o Verify proper installation of the CDF assemblies per 10REQ-0021, para. 1.1.4.1.1.

CN 042

D. FAILURE HISTORY

Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

- o Not applicable to this failure mode.