

SRB CRITICAL ITEMS LIST

SUBSYSTEM: RECOVERY

ITEM NAME: Detonator Subassembly

PART NO.: 10310-0003-802

FM CODE: A02

ITEM CODE: 40-04-17

REVISION: Basic

CRITICALITY CATEGORY: 1

REACTION TIME: Immediate

NO. REQUIRED: 1

DATE: March 1, 2002

CRITICAL PHASES: Final Countdown,
Boost, Separation

SUPERCEDES: March 1, 2001

FMEA PAGE NO.: C-60

ANALYST: S. Finnegan

SHEET 1 OF 3

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CN 044

FAILURE MODE AND CAUSES: Premature operation caused by:

- o High Temperature
- o Shock/Vibration
- o Increased sensitivity due to contamination

FAILURE EFFECT SUMMARY: Premature operation of the Detonator Subassembly during final countdown will cause impact of the nose cap and frustum assembly with the ET or Orbiter resulting in loss of vehicle, mission and crew. Premature operation during boost or separation will cause abnormal aerodynamic forces leading to loss of vehicle control. The prematurely deployed nose cap and frustum assembly will impact other vehicle elements causing loss of vehicle, mission and crew.

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RATIONALE FOR RETENTION:

A. DESIGN

- o Design specification USA SRBE 10SPC-0038
 - No autoignition below 350°F (HMX), paragraph 3.3.6.3 (High Temperature)
 - No autoignition below 275°F (PETN) para. 3.3.6.3 (High Temperature)
 - Shock level per paragraph 3.4.1.4 (Shock)
 - Vibration level paragraph 3.4.1.3 (Vibration)
 - Contamination control per paragraph 3.1.2 (Increased Sensitivity due to Contamination)
- o Predicted temperature will not exceed 151°F per SRB Thermal Design Data Book SE-019-068-2H, Table 4.9.1.1. (High Temperature)

- o Explosive material (HMX) certified to MIL-H-45444. (Contamination)
Explosive material (PETN) certified to MIL-P-387. (Contamination)
- o Hermetically sealed device prevents the entry of contamination following manufacturing. (Contamination)
- o Qualification
 - Autoignition (>275⁰F) (High Temperature)
 - Operating high temperature (250⁰F for 30 minutes) (High Temperature)
 - Thermal Shock (High Temperature)
 - Vibration (Shock/Vibration)
 - Pyrotechnic shock (Shock/Vibration)
 - 10 pound impact (Shock)
 - Qualification per Explosive Technology Test Reports 3653(01) QTR, 3653(01)ATR 4555(05)ATR, 0381(01) QTR, 0954(02) DQTR, and 10134(01) DQTR
 - Qualification per OEA Aerospace Test Reports 3653(01) QTR, 3653(01) ATR, 4555(05)ATR, 0381(01) QTR, 0954(02) DQTR, and 10134(01) DQTR

B. TESTING

- o Lot acceptance test per OEA Aerospace Procedure 4983(01)ATP (All Failure Causes)
 - Helium leak test of entire lot
 - High temperature (+250⁰F) function test of 5 percent of the lot
- o Lot acceptance test per OEA Aerospace Procedure 4983(02) ATP
 - Radiographic examination of entire lot (detonator cord).

C. INSPECTION

VENDOR RELATED INSPECTION

- o Receiving Inspection: All explosive material certifications and test reports are verified one hundred percent. (Contamination)
 - USA SRBE Quality Assurance
USA SRBE Source Inspection Plan (SIP) 1135
- o Assembly Operation: Moisture content determination and explosive core load determination are verified one hundred percent by Contractor Quality Assurance and USA SRBE Quality Assurance. (Contamination)
 - USA SRBE Quality Assurance
USA SRBE Source Inspection Plan 1135
 - Contractor Quality Assurance
OEA Aerospace Acceptance Test Procedure 4983(02) ATP

- o Lot Acceptance Test: X-ray films of detonator cord are examined by certified vendor personnel and verified by USA SRBE personnel. High temperature function test is witnessed one hundred percent. (All Failure Causes)
 - USA SRBE Quality Assurance
USA SRBE Source Inspection Plan 1135
 - Contractor Quality Assurance
OEA Aerospace Acceptance Test Procedure 4983(02) ATP
- o Lot review and certification per USA SRBE Plan 10PLN-0038.
- o Critical Processes/Inspections: The following critical processes and inspections are used to verify that explosive charge is properly sealed and free from manufacturing residues, processing debris and contamination. (Contamination)
 - X-ray of Detonator Cord per OEAA 4983(02) ATP
 - Adhesive bonding per OEAA 4983(04) MP

KSC RELATED INSPECTION

- o Receiving Inspection
 - Shelf Life: Ordnance device shelf life is verified one hundred percent by Shuttle Processing Contractor Quality Assurance per OMRSD File II, Vol 3, Table no. C00CA0.040-000. (Contamination)
 - Damage: Perform visual inspection of pyrotechnic device for evidence of damage, degradation, corrosion, misalignment or moisture per OMRSD File V, Vol. 1 requirement number B000FL.005. (Contamination)
 - Verify that Detonator Subassembly has been flight certified by MSFC as required by NSTS 08060 per OMRSD File V, Volume 1, requirement no. B000FL.002. (All Failure Causes)
- o Installation Inspection
 - Ordnance Installation: Proper installation of the CDF assemblies to the Detonator subassembly is verified per 10REQ-0021, para. 1.1.4.1. (All Failure Causes)

D. FAILURE HISTORY

- o Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

- o Not applicable to this failure mode.