SRB CRITICAL ITEMS LIST

SUBSYSTEM: SEPARATION

ITEM NAME: CDF Manifold, Forward and AFT BSM

PART NO.: 10312-0001-102, 103
10312-0001-104, 105

FM CODE: A02

ITEM CODE: 30-01-02, 30-02-02

REVISION: BASIC

CRITICALITY CATEGORY: 1R

REACTION TIME: Immediate

NO. REQUIRED: 2 Forward and 2 Aft

DATE: March 31, 1997 | DCN032

CRITICAL PHASES: Separation

SUPERCEDES: March 1, 1995 | DCN032

FMEA PAGE NO.: B-8, B-30

ANALYST: S. Parvathaneni | DCN032

SHEET 1 OF 4

APPROVED: P. Kalia

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

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

FAILURE EFFECT SUMMARY: Loss of Mission, Vehicle and Crew due to loss of ability to fire the forward and/or aft separation motors at separation. Loss of separation thrust will lead to vehicle damage caused by recontact between the SRB and Orbiter/ET. One success path remains after the first failure. Operation is not affected until both paths are lost.

REDUNDANCY SCREENS AND MEASUREMENTS:

1. N/A
2. N/A
3. Pass

RATIONALE FOR RETENTION:

A. DESIGN

- Design specification USBI 10SPC-0036
  - Contamination Control per paragraph 3.1.2 and 3.1.3. (Contamination)
  - Explosive material (RDX Type "A") certified to MIL-R-398C. (Contamination)

- o Hermetically sealed explosive cord prevents the entry of contamination following manufacturing. (Contamination)

- o Qualification

  - Proven design qualified for Saturn V per North American Aviation Qualification Test Summary 67MS1148.

  - Delta qualification for SRB per OEA Aerospace Test Report 3612 (01) QTR Rev. B, 0954 (03) DQTR and 10133 (01) DQTR

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    - o 8 and 40 foot drop
    - o Vibration
    - o Pyro shock
    - o Temperature, humidity, altitude
    - o Thermal shock

  - Delta qualification for SRB per OEA Aerospace Test Report 3612 (01) QTR Rev. B, 0954 (03) DQTR and 10133 (01) DQTR

    - o 8 and 40 foot drop
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B. TESTING

- o Lot acceptance test per OEA Aerospace Procedure 4824 (01) ATP

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  - Radiographic Tests of the entire lot. (Voids or Cracks in the Explosive Cord, Improper Gap)

  - Temperature-Humidity-Altitude Test of all destructive LAT samples. (Insensitive Explosive)

  - Low temperature function (-150°F) 5 percent of the lot. (Insensitive Explosive)

- o Explosive material moisture content performed a maximum of thirty days prior to loading per OEAA 4824 (01) ATP. (Contamination)

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- o Explosive cord load determination performed per OEAA 4824 (01) ATP. (Contamination)

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- o Explosive core detonation velocity test performed per OEAA 4824 (01) ATP. (Contamination)

C. INSPECTION

The following inspections are performed.

VENDOR RELATED INSPECTION

- o Receiving Inspection. All explosive material certifications and test reports are verified one hundred percent. (Contamination)

  - USBI Quality Assurance

USBI Source Inspection Plan (SIP) 1136

  - Contractor Quality Assurance

    OEA Aerospace Acceptance Test Procedure 4824(01) ATP. DCN032

- o Assembly Operation - Moisture content determination and explosive loading are verified one hundred percent by Contractor Quality Assurance and USBI Quality Assurance. (Contamination)

  - USBI Quality Assurance

    USBI SIP 1136.

  - Contractor Quality Assurance

    OEA Aerospace Acceptance Procedure 4824(01) ATP. DCN032

- o Lot Acceptance Test. N-ray and X-ray films are examined by certified vendor personnel and verified by USBI personnel. Vibration test is monitored by USBI personnel and high temperature function test is witnessed one hundred percent. (All Failure Causes)

  - USBI Quality Assurance
    USBI SIP 1136

  - Contractor Quality Assurance
    OEA Aerospace Acceptance Test Procedure 4824(01) ATP DCN032

- o Lot review and certification per USBI plan 10PLN-0036.

- o Critical Processes/Inspections: The following critical processes and inspection are used to verify that explosive charge is properly sealed and free from moisture, contamination, cracks, voids or separation at interfaces. (All Failure Causes)

  - N-ray per OEAA 4824(01) ATP
  - X-ray per OEAA 4824(01) ATP
  - Helium Leak Test per OEAA 4824(01) ATP
  - Adhesive application per OEAA 4824(02) MP

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KSC RELATED INSPECTION

- o Receiving Inspections
  - Ordnance Device shelf life is verified one hundred percent by Shuttle Processing Contractor Quality Assurance per OMRSD File II, Vol 3, Table C00CA0.040-000. (Contamination)
  - Each nonelectric pyrotechnic device is visually inspected for evidence of damage, degradation, corrosion, misalignment or moisture per OMRSD File V, Volume 1, requirement number B000FL.005. (Contamination)
  - Verify that the CDF Manifold has been flight certified by MSFC as required by NSTS 08060 per OMRSD File V, Vol. 1, requirement no. B000FL.002. (All Failure Causes)
- o Installation Inspection
  - Verify proper installation of the CDF assemblies to the CDF manifolds per 10REQ-0021, para. 1.1.4.1 (forward) and 2.1.1.1 (aft). (Contamination, Improper Gap at External and/or Internal Interfaces)

D. FAILURE HISTORY

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

E. OPERATIONAL USE

- o Not applicable to this failure mode.