SUBSYSTEM: ELECTRICAL AND INSTRUMENTATION

ITEM NAME: Aft OF MDM or AFT OF EMDM

PART NO.: 10400-0452-802 or   FM CODE: A11
                  10400-0941-801

ITEM CODE: 50-02-01-03   REVISION: 3

CRITICALITY CATEGORY: 1R   REACTION TIME: Immediate

NO. REQUIRED: 1   DATE: March 1, 2002

CRITICAL PHASES: Boost   SUPERCEDES: March 31, 1998

FMEA PAGE NO.: D-139   ANALYST: C. Webster/S. Finnegan

SHEET 1 OF 3   APPROVED: S. Parvathaneni

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FAILURE MODE AND CAUSES: Loss of both HPU A2 and B2 start commands (Controllers on) caused by:

o   DOL Modules (open)
o   IOM power supply modules (open or shorted)
o   Wiring harnesses/motherboards (open or shorted)

FAILURE EFFECT SUMMARY:

o   Loss of thrust vector control caused by loss of HPU A and B leading to vehicle breakup and loss of mission, vehicle and crew.

o   One success path remains after the first failure. Operation is not affected until both paths are lost.

REDUNDANCY SCREENS AND MEASUREMENTS

1) Pass -   APU speed rate measurements B46R1406C thru B46R1409C. Fuel Shut Off Valve position measurements B46X1861X and B46X1863X.

2) Pass -   Same as screen 1.

3) Pass -   No credible causes.

RATIONALE FOR RETENTION:

A. DESIGN:

    1. System Description

        See Appendix C, Section 1, Paragraph (s) B, C

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    2.   Component Description

       See Appendix C, Section 2.

B. TESTING

    1)   VENDOR RELATED:

       See Appendix C, Section 3, Paragraph(s) <u>A</u> & <u>B</u>

    2)   KSC RELATED:

       See Appendix C, Section 3, Paragraph <u>C</u>

    3)   SYSTEM FUNCTIONAL/FAILURE MODE UNIQUE:

Aft Skirt ACO Test - The SRB Aft Skirt MDM pre-launch verification, HPU start-up, and MDM Lockout tests are verified per OMRSD File II, Vol. 1, Requirement Numbers S00FE0.185, S00FR0.070 and S00FS0.090. The SRB APU BITE resistance test and fuel pump bearing soak are verified per File V, Vol. 1, requirement numbers B42AP0.050 and B42AP0.080. These tests verify the DOL modules, IOM power supply modules, and wiring harnesses/motherboards.

Shuttle Interface Test - APU BITE resistance, BITE frequency, MDM Operational Mode, and MDM Lock/Unlock tests are verified per OMRSD File V, Vol. 1, Requirement Numbers B42AP0.050, B42AP0.060, B75MD0.011 and B75MD0.020. These tests verify the DOL modules, IOM power supply modules, and wiring harnesses/motherboards. (All Failure Causes)

Terminal Countdown Demonstration Test - The SRB Aft Skirt MDM pre-launch verification, HPU start-up, and MDM Lockout are verified per OMRSD File II, Vol. 1, Requirement Numbers S00FE0.185, S00FR0.070 and S00FS0.090. The SRB APU BITE resistance and BITE frequency tests are verified per File V, Vol. 1, requirement numbers B42AP0.050 and B42AP0.080. These tests verify the DOL modules, IOM power supply modules, and wiring harnesses/motherboards.   (All Failure Causes)

Launch Countdown to requirements of Launch Commit Criteria - The SRB Aft Skirt MDM pre-launch verification, HPU start-up, and MDM Lockout are verified per OMRSD File II, Vol. 1, Requirement Numbers S00FE0.185, S00FR0.070 and S00FS0.090. The SRB APU BITE resistance and BITE frequency tests are verified per File V, Vol. 1, requirement numbers B42AP0.050 and B42AP0.060. These tests verify the DOL modules, IOM power supply modules, and wiring harnesses/motherboards.   (All Failure Causes)

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In addition, each time the MDM (EMDM) is powered up, an initialization sequence verifies that the failure mode does not exist.

Supercedes: March 31, 1998   DRD 1.4.2.1-b

<u>Last</u> <u>Test</u> <u>for</u> <u>Failure</u> <u>Mode</u> <u>Prior</u> <u>to</u> <u>Launch</u>

The last test of this failure mode are conducted per OMRSD File II, Vol. I Requirement Number S00FR0.070 (APU Startup) and S00FE0.185 (MDM/EMDM pre-launch verification). (All Failure Causes)

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The above referenced OMRSD testing is performed every flight.

C. INSPECTION

1) VENDOR RELATED:

See Appendix C, Section 4.

2) KSC RELATED:

See Appendix C, Section 5.

D. FAILURE HISTORY

Failure Histories may be obtained from the PRACA database.

E. OPERATIONAL USE

Not applicable to this failure mode.

F. WAIVER/DARS

See Appendix E, Paragraph 2, 7-15.

Supercedes: March 31, 1998   DRD 1.4.2.1-b