

CRITICAL ITEMS LIST (CIL)

SYSTEM: Electrical
 SUBSYSTEM: GM2 Pressurization System
 REV & DATE: J, 12-19-97
 DCN & DATE:
 ANALYSTS: J. Joseph/A. Oser

FUNCTIONAL CRIT: 1R *
 PHASE(S): a, b
 HAZARD REF: E.01, P.06,
 S.04, S.09

FAILURE MODE: Fails Open

FAILURE EFFECT: a,b) Loss of mission and vehicle/crew due to tank structural failure from overpressure.
 b) Loss of mission and vehicle/crew due to fire/explosion when relief valve opens.
 Loss of mission and vehicle/crew due to loss of NPSP prior to SRB separation.

TIME TO EFFECT: Minutes

FAILURE CAUSE(S): A: Faulty Pin
 B: Broken Wire
 C: Connector Separates

REDUNDANCY SCREENS: Screen A: PASS
 Screen B: FAIL - Not detectable in flight.
 Screen C: FAIL - Failure of cable tray.

FUNCTIONAL DESCRIPTION: Harnesses route the excitation voltage indication and return functions between the ET/Orbiter interface and each pressure transducer.

| FMEA ITEM CODE(S) | PART NO. | PART NAME | QTY | EFFECTIVITY |
|-------------------|-----------------------------------------------|-----------|-----|----------------|
| 3.4.2.1 | 80933003704-379 (314W01 J1/J2/ Splices) | Harnesses | 1 | LWT-54 thru 88 |
| | -549 | | 1 | LWT-89 & Up |
| 3.4.3.1 | 80933003704-380 (314W02 J1/J2/ Splices) | Harnesses | 1 | LWT-54 thru 88 |
| | -550 | | 1 | LWT-89 & Up |

REMARKS: * Item criticality is increased to 1 during intact abort since the ET pressurization system is not single failure tolerant with one SSME out (one FCV nonfunctional). Failure of an ullage pressure transducer circuit such that the corresponding FCV fails open causes ullage pressure to increase until the relief valve opens. Subsequent venting of GH2 is criticality 1 since there is always a possible ignition source such as lightning.

These harnesses are grouped since the failure mode and Rationale for Retention are the same.

CRITICAL ITEMS LIST (CIL)
CONTINUATION SHEET

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RATIONALE FOR RETENTION

DESIGN:

Engineering process specification, STP6508 establishes the requirements for fabrication and installation of airborne electrical interconnecting wire and cable assemblies. Harness assemblies produced as specified in STP6508 will meet the applicable requirements of MIL-W-8160 and 40M39582A.

The wire is procured from vendors that have qualification approval from Lockheed Martin. The vendors meet material specification STM E659.

For additional weight savings on SLWT, spare wires were eliminated from the harnesses.

Crimped splices are used to connect harnesses to the pressure transducers.

- A: The connector is designed with alignment tolerances to ensure proper insertion. Pins have rounded tips and the insert is designed with a tapered entry to guide the male contact for a firm mating and to preclude bent pins.
- B: Electrical wires, cables, and bundles are routed to avoid abrasion, cutting or piercing of the insulation by contact with rough surfaces or sharp edges along the mounting surfaces. Sufficient slack is provided for installed harnesses to avoid strain on the conductors within the harnesses, termination points and associated connectors.
- C: The connector is designed with a positive locking mechanism which ensures a positive lock for the coupling ring when the plug is fully mated with the receptacle and provides an audible sound when the coupling ring is seated in the positive lock position.

Redundancy Description

Since each transducer circuit is in a separate cable harness and since the fails open mode gives rise to either false high or false low readings, the redundancy description and effects of loss of redundancy are the same as described for the corresponding mode of the GH2 pressure transducers.

TEST:

The harnesses and harness components are certified. Reference HCS MMC-ET-TM08-L-E051.

Vendor:

Piece parts for the electrical system are procured and tested to approved Lockheed Martin specifications E659 and E741 and Government Specifications 40M39569 and 40M39582.

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RATIONALE FOR RETENTION

TEST: (cont)

MAF:

- A: Perform Contact Retention Test (STP6501).
- A-C: Perform DC Resistance Test of Harness from end to end termination points (STP6508 and TM04k).
- A-C: Perform DC Resistance Test from excitation to return (TM04k).
- A, B: Perform crimp tool certification test (STP6504 for pin and sockets and STP6503 for splices).

Launch Site:

- A-C: Perform Harness and Transducer Operational Test (OMRSD FILE II).

INSPECTION:

Vendor:

Surveillance by Lockheed Martin Procurement Quality is performed to ensure compliance with Specifications.

MAF Quality Inspection:

- A: Witness Contact Retention Test (STP6501).
- A: Inspect connector pins and sockets for freedom of damage, are not broken, bent, misaligned or corroded and the connector is free of foreign material (STP6501).
- A, B: Inspect for proper crimp configuration and freedom of physical damage (STP6503 for splices and STP6504 for pins and sockets).
- A, B: Verify certification of crimping tool (STP6504 for pins and sockets and STP6503 for splices).
- B, C: Inspect the installed harnesses per the installation requirements (STP6508).
- C: Witness connector mating (STP6501).
- A-C: Witness DC Resistance reading of Harness end to end termination points (STP6508 and TM04k).
- A-C: Witness DC Resistance Test from excitation to return (TM04k).

Launch Site:

- A-C: Witness Harness and Transducer Operation Test (OMRSD FILE II).

FAILURE HISTORY:

Current data on test failures, unexplained anomalies and other failures experienced during ground processing activity can be found in the PRACA data base.