

Critical Item: HIM Power Assembly (HPA)
Total Quantity: 1
Find Number: 83K01132
Criticality Category: 1S

SAA No:	09IT09-001	System/Area:	LPS CCMS/FR1/FR2/CR3/CR4
NASA Part No:	83K01132	PMN/ Name:	L72-0400-14/ HIM-II
Mfg/ Part No:	Transistor Devices Ino./SPS3960	Drawing/ Sheet No:	83K01102/ 8-15

Function: Provides the power for HIM-II operation. Provides three major functions: AC power conditioning and distribution, AC/DC and DC/DC power conversion, and power status and control.

Critical Failure Mode/Failure Mode No: Out of range (high, low, no output)/09IT09-001.505.

Failure Cause: Piece part failure.

Failure Effect: FEP polls of the HIM will detect loss of HIM. The FEP will stop further processing with that HIM resulting in loss of data link. For the Hypergol Vapor Detection System (HIM 6397) this would result in loss of capability to detect leaks during hazardous operations at Pads A and B. Possible loss of life and/or vehicle in the event of a hazardous condition. Detection method: System status checks will detect failure. Time to effect: Immediate.

ACCEPTANCE RATIONALE

Design:

- The HIM-II design requirements are defined in 83K01101 "Hardware Requirements for the Hardware Interface Module (HIM) HWCI P200-HW".
- The HPA design supports reliability and maintainability requirements associated with fault detection and isolation, accessibility, tests points, and diagnostics. The mean time between failure (MTBF) per MIL-HDBK-217F is 35,000 hours.
- The HPA is provided with two input power sources for HIM operations. Automatic switching is provided without interruption or fluctuations of the HPA's output.
- In-line circuit breakers are provided for both input power source lines for over-current protection.
- EMI filters are provided for power line filtering for both input sources.
- The HPA's DC outputs are latched in the "off" state when an output over-voltage or HIM over-temperature condition exists.
- The HPA provides protection against output over-current and short circuit conditions.

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- Transient suppression is provided to prevent transients on the power inputs from being passed to the HPA power or status outputs.
- The HPA status and control function contains circuitry to detect an out-of-range condition (i.e., a failed state) on the AC and DC inputs.

Test:

- OMRSD File VI Volume I, Baseline 12/13, "LOA MMH/N204 Servicing System", requires a sensor functional test prior to each flow. OMI V3542 "Hypergol Vapor Detection System Operations Support (LPS)" provides this end-to end verification of the system (LPS/HVDS). This functional test verifies system sensors and HIM operation.
- During hypergol loading operations, personnel (in soaps) are positioned on the RSS to provide visual monitor capability.

Inspection:

- LPS system integrity is continuously monitored by on-line software programs (i.e. HWMON, EMON, etc.). These programs provide health and status data to systems operators. FEPs poll the HIMs and their Input/Output Cards on a cyclic basis (1, 10, or 100 times/second) verifying the communication link with HIMs assigned. Along with status and health checks, exception monitoring provides operators notification of any change of state of HIM measurement cards.
- In addition to continuous on-line system status monitoring, OMRSD File VI Volume I, Baseline 85.20, Launch Processing System Checkout, Control and Monitor Subsystem LPS/CCMS, requires verification of HPA backup power capability every 360 days. OMI C6045 "HIM II Preventive Maintenance And Inspection" is the procedure which implements this requirement.

Failure History:

- Current data on test failures, unexplained anomalies, and other failures experienced during ground processing activities can be found in the PRACA database. Since no units were installed at the time this analysis was performed no PRACA data was available.
- The GIDEP failure data interchange was researched and no failure data was found on this component in the critical failure mode.
- Testing performed on receipt of HIM hardware from the vendor disclosed a problem with the HPA AC Bias Board. A redesign of that board has been identified to correct the problem.

Operational Use:

- **Correcting Action:**

For the Hypergol Vapor Detection System, loss of the HIM during loading operations would result in termination of loading. Once terminated the faulty HIM card would be replaced. Loss of the HIM at any other time would have no critical effect.

- **Timeframe:**

Replacing a failed component or HPA would take approximately 30 to 59 minutes.