

Critical Item: Ground Support Equipment (GSE) Transition Card (GTC) JUN 10 1997
Total Quantity: 1
Find Number: 83K01148
Criticality Category: 1S

SAA No:	09IT09-001	System/Area:	LPS CCMS/FR1/FR2/CR3/CR4
NASA		PMN/	L72-0400-14/
Part No:	83K01148	Name:	HIM-II
Mfg/	Data Products New England	Drawing/	83K01102/
Part No:	(DNE) Technologies/ 830011480	Sheet No:	8-38

Function: Provides the communications path between the GSE data bus interface (i.e. FEP) and the HIM internal VMEbus backplane. Provides Manchester II encoding/decoding, signal level conversion, isolation, and protection.

Critical Failure Mode/Failure Mode No: Loss of output (to FEP)/09IT09-001.507. Unsolicited output/09IT09-001.508.

Failure Cause: Piece part failure.

Failure Effect: Loss of Output. Loss of data link (FEP/HIM/GSE). For the Hypergol Vapor Detection System (HVDS), HIM 6397, this results in loss of capability to detect leaks during hazardous operations at Pads A and B. Possible loss of life/vehicle in the event of a hazardous condition. Detection method: System status checks will detect failure. Time to effect: Immediate.

Unsolicited outputs. FEP polls will detect unsolicited outputs of the GTC and stop further processing with that HIM. For the HVDS, HIM 6397, this results in loss of the capability to detect leaks during hazardous operations at Pads A and B. Possible loss of life/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 GSE Transition Card assembly 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 250,000 hours.
- The GTC PCB is fabricated on a double height VME card (6U) using six layers. The six layers are comprised of four signal planes (digital and analog), one power plane, and a ground plane.

JUN 10 1997

- The GTC assembly is designed with the constraint of ruggedization. Careful component placement, and use of a stiffener, has been implemented to comply with this constraint.
- Card provides fuse protection for all VMEbus power connections.
- Card provides transformer isolation to isolate the GSE data bus interface and the VMEbus.
- The card's line driver is disabled when a fail signal is detected at the interface.
- Card's line drivers and receiver are DC isolated from the data bus.
- The card's line drivers and receiver are protected from line induced common-mode transients.
- Card provides short circuit protection for the down-link output driver.
- The card provides receiver error signal when an error is detected in the incoming encoded transaction.
- Input signal filtering is also provided.

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 scope) 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.

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.

JUN 10 1997

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 card would take approximately 30 to 59 minutes.