

**Critical Item:** 3 x 1 Summing Amplifier Module

APR 28 1999

**Find Number:** 78K01550 2ea.**Criticality Category:** 1S**SYSTEM**

Hypergol Vapor Detection Sys

AREA	CRIT	TOTAL LRU'S
LOA	1S	2

**SAA No:** 09IT09-001**System/Area:** LPS/CCMS/FR1/FR2/CR3**NASA****PMN/** L72-0500-02**Part No:** 78K01550**Name:** V & DA**Mfg/****Drawing/****Part No:** None**Sheet No:** MCR7656 VOL. III 5.2 (REV FL) |

**Function:** This TLCE Critical Item is used in support of a critical user system. It provides the capability to sum up to three 124 OHM input signals into one 124 OHM output signal.

**Critical Failure Mode/Failure Mode No:** \* Failure Mode - Loss of Output/09IT09-001.494

\* 3 x 1 Summing Amplifier Module failures would result in loss of communications between a FEP and HIM resulting in loss of the data path for the critical system being monitored/controlled.

**Failure Cause:** Electrical/Electronic failure of LRU piece part

**Failure Effect:**

SYSTEM	FAILURE EFFECT	CRIT
Hypergol Vapor Detection System (LOA)	Loss of output signal will fail to provide the console operator with an input that would indicate a leak in the hypergol propellant servicing system. Loss of the capability to detect a leak during hazardous operations could result in loss of life and/or vehicle. Time to effect: Immediate. Detection method: Software detects loss of communication.	1S

3 x 1 Summing Amplifier Module (Continued)

APR 28 1989

### ACCEPTANCE RATIONALE

**Design:** The 3 x 1 Summing Amplifier Module was designed per the requirements of the following documents.

1. CP09IT0910: General design requirements specification for LPS/CCMS.
2. CP09IT0917: Contract end item assembly specifications for V&DA for LPS/CCMS.

**Test:** Rigorous sets of acceptance tests were performed to verify performance and design requirements of the LPS/CCMS. This process occurred on each end item from "In Process Assembly" phase to "Site Acceptance". Master control procedures (MCPs) 78K-M401 and 78K-M701 were utilized for acceptance testing by MMC. Following this acceptance testing IBM performed integrated testing of each set. Test procedures KSC-LPS-IB-086, Book 3 and KSC-LPS-IB-105, Book 5 were utilized.

#### Hypergol Vapor Detection Sys

- OMRSD File VI Volume 1 requires a sensor functional test prior to each flow. OMI V3542 "Hypergol Vapor Detection System Operations Support (LPS)" provides an end-to-end verification of the system (LPS/HVDS).
- During loading operations, personnel are stationed on the RSS to provide visual monitor.

**Inspection:** LPS system integrity is continuously monitored by on-line software programs. These programs provide health and status to system operators. Proper V&DA operation is verified during user system end-to-end verification.

#### Failure History:

The PRACA Data Base was used for this analyses (time frame APR. 88 to Sep. 90): There were 9 Problem Reports initiated on 3 x 1 Summing Amplifier Modules that relate to failure modes depicted on this CIL sheet. There is a total population of 77 3 x 1 Summing Amplifier Modules installed in various CCMS Station Sets. In the basic SAA the timeframe of Jan. 84 to Mar. 88 was used with 11 Problem Reports identified from a total population of 59 modules installed. Operation use varies from 7 days a week, 24 hours a day to as required.

**3 x 1 Summing Amplifier Module (Continued)**

**APR 28 1996**

**Operational Use:**

- **Correcting Action:**

Troubleshooting required to isolate and replace failed unit.

- **Timeframe:**

Varies, troubleshooting required.