NASA TECH BRIEF

Manned Spacecraft Center

Software Control For Large Scale On-Board Checkout: A Concept

The problem:

To monitor over 4000 test points of sensory data coming from several subsystems. A data management system must provide a self-checking capability for the monitoring system and be able to recover from unexpected error or failure interruptions. In addition, it must perform operational duties of navigation, control, and experimentation.

The solution:

A two level system checkout in which the first level satisfies the continuous monitoring requirements, and the second level provides fault isolation to satisfy the maintenance requirements.

How it's done:

The program contains the test, control, monitoring and operational features required for the system, including an interrupt feature to permit rapid servicing for malfunctions or errors. Automatic polling and limit checking of system test points are performed at the signal sources for equipment failure detection. The word format is such that flag bits, in designated bit positions within each word, will indicate specific remote data acquisition channels are out of tolerances. A copy of the bit register output is maintained within data bus terminals which provide the interface to the data bus. Data bus controllers performing as input/output channels poll the terminal registers for out of tolerance flag bits.

Specific operational duties and maintenance tests are flowed and sized. These tests include processor tests, memory tests, channel/terminal/signal source wrap tests, and display tests. To support these tests block formats and tables are itemized including: a device address table, a limit check table, a data path table, a rate table, a repair time table, a processor table, a directory table, and a memory allocation table.

To support program interruption and restart, a data logging system for checkpointing and restart is evolved and supervisory flows for the data logging are developed. Executive services of both a master and an on-board checkout executive are itemized for support of the on-board checkout functions.

Notes:

1. This invention is in the conceptual stage only. At the time of this publication no model or prototype exists.
2. Requests for further information may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center, Code JM7
   Houston, Texas 72058
   Reference: TSP72-10015

Patent status:

No patent action is contemplated by NASA.

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