GCF Central Performance Monitor — Functional Description

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This article describes the Ground Communications Facilities (GCF) Central Performance Monitor (CPM) which gathers information on the operational status of the Central High Speed and Wideband Assemblies. This monitor information is formatted and forwarded to the Central Communication Monitor Processor. The CCM Processor, in turn, provides near real time displays and printouts of the status information and any resulting alarm indications. The ability of the GCF to quickly detect and correct circuit failures will be enhanced by the addition of the CPM.

I. Introduction

The Central Performance Monitor (CPM) is an integrated part of the Central Communication Monitor Assembly (CCMA) within the Ground Communication Facilities (GCF) Monitor and Control Subsystem located in the Central Communication Terminal (CCT) at JPL. The GCF provides for interconnecting the Deep Space Stations with the Space Flight Mission Operations Center and the Network Operations Control Center for the DSN. The Mission Operations Center (MOC) processes the data acquired by the Deep Space Network Stations and issues commands to be sent to the spacecraft through the Stations. The Network Operations Control Center processes data to determine network status and issues messages for network control purposes. These data interchanges are conducted in real-time and must be accomplished with high reliability.

The CCMA is provided with the status and parameters by the CPM. The CCMA, in turn, provides Operations with centralized real-time display on the performance of all GCF circuits. Prompt correction can then be accomplished for faulty data links. The CPM, therefore, plays a key role in accumulating real-time performance data of the communication channels.

II. Hardware Functional Description

The Central Performance Monitor (CPM) provides the hardware function of monitoring circuit performance signals for up to four wideband channels and up to eighteen High Speed Data Channels (see Fig. 1). The performance signals monitored can be grouped into three categories: Signals to be sensed, signals to be sensed and held, and signals to be accumulated.

The CPM has two identical CCM computer ports. Each port provides for a 14 line interface. The 14 lines of each port include a unidirectional stimulus from device (STD), a unidirectional stimulus from computer (STC), a bidirectional

response line (RSP), a bidirectional ready line (RDY), eight bidirectional data lines (D1 through D8), and two bidirectional function lines (F0 and F1). All bidirectional lines are used to both transmit and receive. A special power sense (PS) line is routed to the computer to inform the computer whether the CPM power is on or off.

The CPM is switch selectable to be brought on-line with either of the two CCMA computers. Upon request from the on-line CCMA computer, the CPM will arrange and forward all the gathered information in a format acceptable to the computer through the 14-line interface.

The CPM reporting period can be varied, and is defined by software. However, the reporting period should not extend beyond the time that it takes to accumulate a maximum count of 255 of either Data Block Detected signals or Block Error Detected signals from any one of the four wideband channels. Figure 2 shows the functional block diagram for the CPM.

III. Information Monitored

The specific signals monitored for each of the four (4) wideband channels are carrier ON/OFF, SEARCH, NO MATCH, SYNC FAIL, REQUEST-TO-SEND, REQUEST-TO-SEND FAIL, ON-SITE-COMPUTER RECEIVING, DATA BLOCK DETECTED AND BLOCK ERROR DETECTED.

The carrier ON/OFF and SEARCH are sense only signals. The status of these signals are reported as "ON" only if they are "ON" at the instant of computer interrogation.

NO MATCH, SYNC FAIL, REQUEST-TO-SEND, REQUEST-TO-SEND FAIL, and ON-SITE COMPUTER-RECEIVING are sense and hold signals. An occurrence of an event during the interrogation interval is stored and reported when interrogated.

The Data Block Detected and Block Error Detected signals are accumulated respectively during the interrogation interval and the count results reported to the computer.

For the High Speed Subsystem, the only signal that is monitored by the CPM is the Data Set Carrier ON/OFF information which is a sense only signal. However, other monitor information for the High Speed, similar to that gathered for the Wideband, is obtained through the Error Detection Correction (EDC) and the High Speed Switch (HSW) Assemblies of the GCF.

IV. Conclusion

The CCM computer accepts the monitored data as provided by the CPM, EDC, and HSW Assemblies and calculates each circuit throughput and displays the status and alarm, if any, on the display and other data recording devices for the GCF technical controller use.

The combining of the High Speed and Wideband circuit performance information into one centralized display eliminated display switching and promotes speedier operator responses to alarmed circuits. Thus, any channel anomalies and faulty circuits can be rapidly located and prompt substitution or service can be performed.
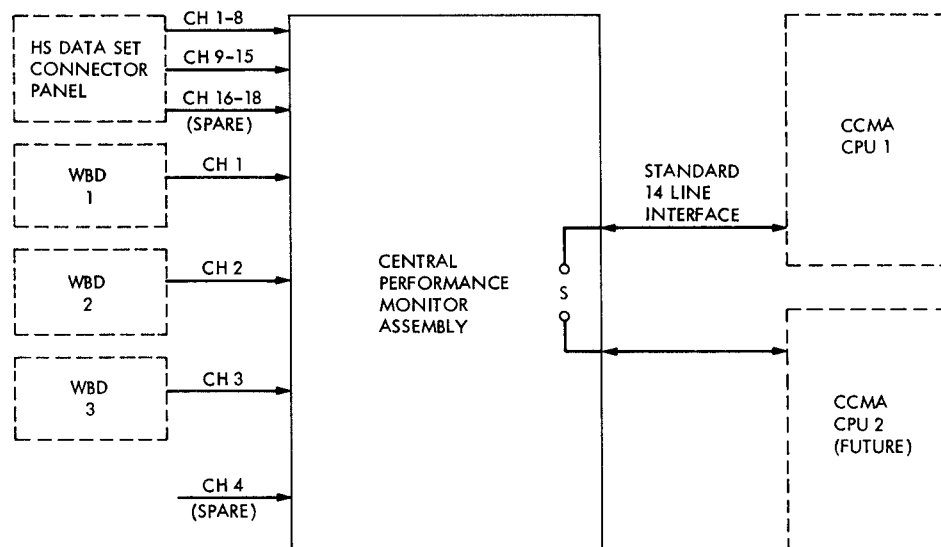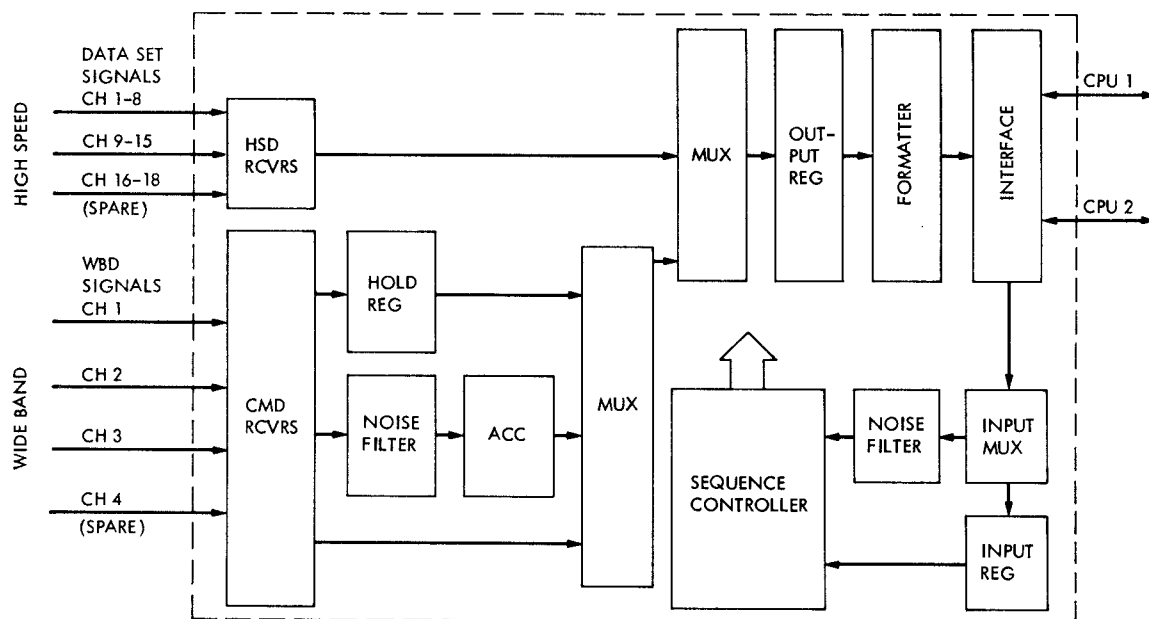
Fig. 1. Central performance monitor interfaces

Fig. 2. Central performance monitor functional block diagram