GCF Area Communications Terminal Subsystem High-Speed Data Regeneration Assembly

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The incorporation of a High-Speed Data Regeneration Assembly at the Area Communications Terminal located at the Goldstone Deep Space Communications Complex has provided the necessary interface for high-speed data entering or leaving the complex. The physical as well as electrical characteristics are described.

I. Introduction

This article describes the addition of a High-Speed Regeneration Assembly (HSRA) at the Area Communications Terminal (ACT) located at the Goldstone Deep Space Communication Center (DSC 10). DSC 10 is located within the Goldstone Deep Space Communications Complex (GDSCC). The Evans article[1] in this issue depicts the location functionally of the HSRA within the Ground Communications Facility (GCF).

The ACT is the trunking and interface center for all operational communications between the DSSs located at GDSCC and the outside world. The ACT provides the capability for routing and conditioning all communications entering or leaving the complex.

[1]Evans, R. H., "GCF High-Speed Data System Design and Implementation for 1971–1972" (this issue).

II. Physical Characteristics

In Fig. 1 the two bays on the right contain seven Western Electric 203A data sets. The two bays on the left contain the test equipment and patching jacks. The HSRA is self sustaining in that all the test equipment required to keep it in operation is an integral part of the assembly. *All test equipment* for this application is defined as test equipment required to maintain *on line* conditions.

The seven 203A data sets make up three full-duplex (FDX) circuits (transmission in both directions simultaneously). It takes a pair of data sets to make up one regeneration circuit. The seventh data set is used for a spare in the event of a failure.

The data set has two interfaces. One interface is on the digital side and the other interface is on the audio side. For regeneration application the digital sides of a pair of data sets are connected together. The audio sides of the data sets are connected to the transmission media.

III. Electrical Characteristics and Connections

The 203A data set converts digital information into audio information suitable for transmission over voice circuits in the 300- to 3000-Hz band. The transmission media must meet certain requirements to satisfy a specific long-term error rate as specified in Footnote 1.

These requirements are reiterated here for convenience. The transmission circuit of each data set (audio) should meet American Telephone and Telegraph C-2 specifications. A specific long-term error rate can be expected when operating the data set over a C-2 grade transmission circuit. If two C-2 grade circuits are operated in tandem, then the error rate can be expected to double.

Figure 2 depicts the main connection of a pair of data sets configured in a regeneration mode. These connections take place on the digital side. The Receive Data (RD) of one data set is connected to the Send Data (SD) of its conjugate. The Serial Clock Receiver (SCR) of the same data set is connected to the Serial Clock Transmitter External (SCTE) of its conjugate.

Audio information received by one data set is converted to digital information. The digital information is passed on to the second data set via the RD–SD connection. The second data set converts the digital information back into audio information to be retransmitted on to the transmission media. The SCTE–SCR connections guarantee that the transmitted information is in synchronization with the received information.

All digital and audio interface points are routed through patching jacks to facilitate testing and substitution of a failed data set. Test equipment is also terminated on jacks so that the *on-line condition* of the data sets can be monitored from the front of the bays.

In addition to the standard test equipment furnished, there is a Data Set Control Panel associated with each data set. The Data Set Control Panel provides for visual monitoring of critical digital and audio signal functions, and will indicate failure if one should arise. Those digital functions monitored are: Request to Send (RS), Clear to Send (CS), Data Set Ready (DSR), and Serial Clock Transmit External (SCTE). Audio signal functions monitored are: Carrier On (CO), Carrier On Delayed (COD), and Signal Quality (SQ).

IV. Summary

The HSRA installed at the ACT provides the capability of regenerating three high-speed full-duplex circuits with one data set used as a spare. In addition all test equipment (digital and audio) required to keep the HSRA *on line* is an integral part of the assembly. A Data Set Control Panel monitors visually critical digital and audio functions of the data sets. The HSRA provides the interface between off-complex high-speed data and all DSSs located at the Goldstone Deep Space Communications Complex.

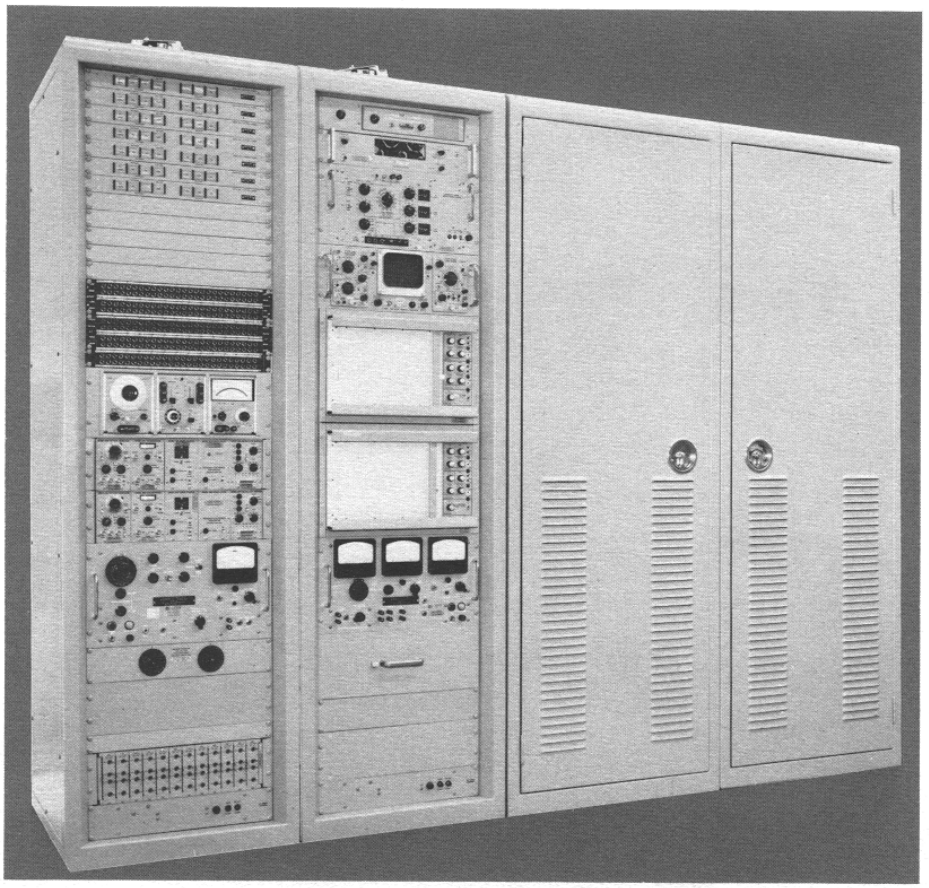

Fig. 1. High-Speed Regeneration Assembly

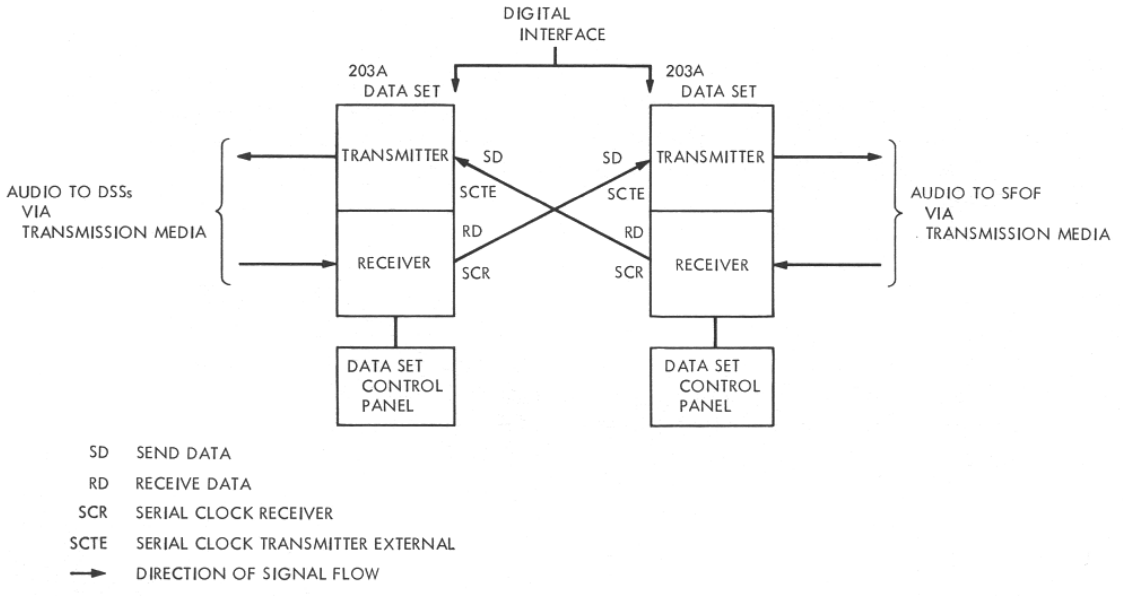

Fig. 2. Interconnect diagram