TELEMETRY REMOTE MODULES

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The Telemetry Remote Module development has been an outgrowth of a GSFC-initiated investigation into methods of improving data gathering capabilities. This effort has provided, after an initial group of competitive studies, a fully operational breadboard and engineering model which meets all design goals.

The technique I am discussing forms the basis for a decentralized telemetry system which employs small, low powered modules capable of distributing the multiplexer input gates around the spacecraft rather than concentrating them in one centralized location. These modules operate, in essence, as a harness reducer, allowing data to be transmitted back to a central control core for inclusion in the telemetry bit stream.

The remote module developed in this effort is shown in Figure 1. Each unit is capable of accepting 32 data points in various combinations of analog and/or digital input information. These inputs can be controlled either through a hardwired or programable central control core sequence. Each module weighs 113 g, occupies 98 cm^3, and requires a maximum power of 1.3 W during the interrogate mode.

System applications of the remote modules and several of the reasons why this development has been pursued and the advantages which can be derived from remote modules are illustrated in Figure 2. The central control core and gate address generator serve to generate the sequence of addresses for the data points being sampled and for the formating of data. These items are not per se part of this development. Also, the total weights, size, and power parameters for both a remote module decentralized system and a centralized system, with the same basic data gathering capabilities, are roughly equivalent.

A prime advantage in the utilization of decentralized remote modules is a reduction in the number of interconnecting wires between the central control core and the data inputs. Where previously each of the 32 data inputs would require separate harness wires, the use of remote module permits the 32 lines previously required to be reduced to five. The weight savings alone for major spacecraft requiring long runs can be quite significant. There is also a more subtle advantage in that additional flexibility in specifying harness wire interface requirements is achieved.

Another advantage of the remote module is that data gathering capabilities can be tailored more closely to user requirements. Figure 2 illustrates how this building-block approach of one or more remote modules per user could be implemented.

The last item I will discuss here is the universality which has been built into the system. This is typified by the capability of intermixing inputs in several combinations of analog or digital data. Flexibility is also designed into the system's ability to accept analog data in the range from +10 to -10 V. The data rate also provides flexibility in that it can vary from 0 to 3200 channels per second with a digital resolution of 8 bits per word.

The above discussion has been an attempt to summarize a development that has produced a system which meets several fundamental spacecraft needs: standardization, increase in system simplicity, and greater flexibility in the use of telemetry systems.

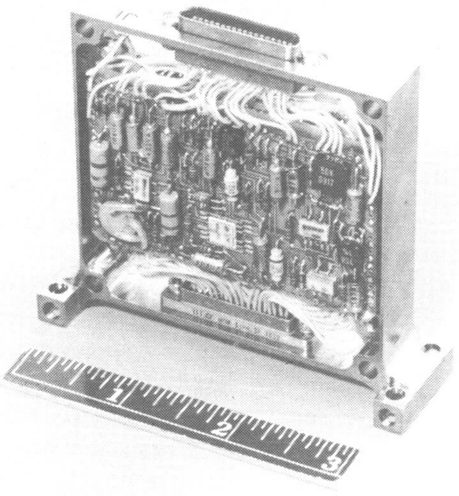

Figure 1–Engineering model of remote module.

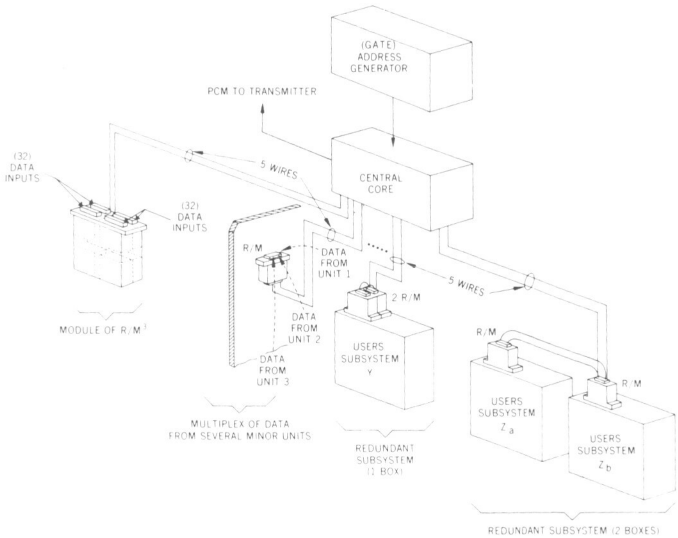

Figure 2–Remote module implementation.