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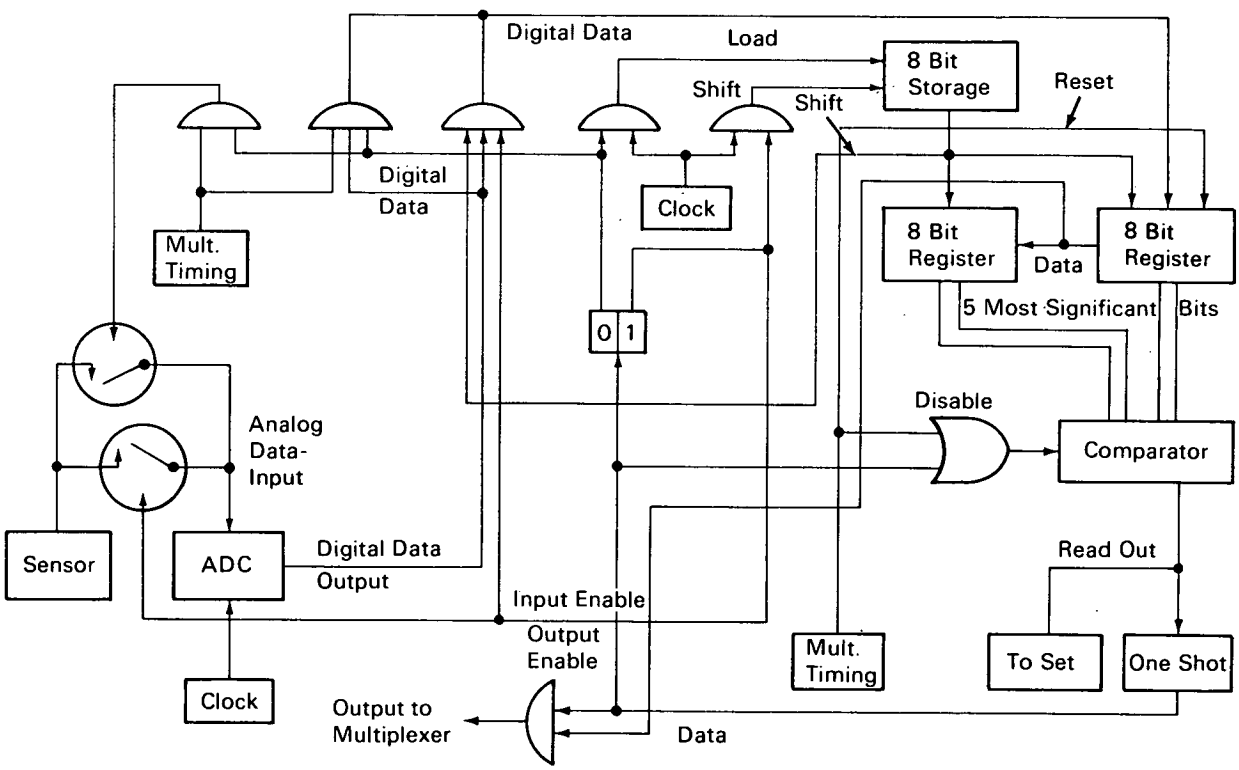
NASA TECH BRIEF

Manned Spacecraft Center

Digital Telemetry System Eliminates Data Redundancy



Zero Order Predictor with Floating Aperture

The problem:

To devise data processing techniques for the compression of and the elimination of redundancy in telemetered data obtained from biomedical, engineering control, and earth resources satellite sensors.

The solution:

A floating aperture, zero-order predictor (ZOP) circuit which eliminates redundancy by examining the data from each sensor before that data is multiplexed and transmitted. In the floating aperture ZOP, an aperture (or tolerance) is placed on the last transmitted data point. If each new data point lies within this tolerance, it is not transmitted. New data points which fall outside the tolerance are transmitted along with the tolerance value placed on them. The digital devices used to implement the design are off-the-shelf items such as gates, registers

(continued overleaf)

and flip-flops, which are readily amenable to large-scale integration techniques.

How it's done:

Basically, the ZOP circuit shown in the figure takes the form of two shift registers which store a data sample, n, and a subsequent sample, n + 1. These samples are loaded into the registers for processing by the comparator. If they differ by a predetermined tolerance, the comparator output triggers the one-shot multi-vibrator whose output turns on the data gate for a time equal to 8 clock periods. This is the time required to shift the 8-bit data sample in register 1 for transmission and move the data sample to register 2. While the data sample in register 1 is emptying into register 2, a new sample, n + 2, synchronously shifts into register 1. The ZOP is now ready to repeat the entire process, having been loaded with a new sample, n + 2, for comparison with the previous sample. If a subsequent data sample is within the aperture, it is considered redundant and is discarded by resetting register 1 with multiplexer timing signals.

The tolerance has been arbitrarily selected at 3.1% (equal to a 5-bit comparison). Additional logic gates added to the shift register could improve resolution to 1.5% during high data activity periods. If greater accuracy is desired, additional data register stages can be employed.

Note:

Request for further information may be directed to:

Technology Utilization Officer
Manned Spacecraft Center, Code JM7
Houston, Texas 77058
Reference: TSP71-10082

Patent status:

No patent action is contemplated by NASA.

Source: R. L. Hymer
Manned Spacecraft Center
(MSC-12388)