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NASA TECH BRIEF

Automatic Testing Device Facilitates Noise Checks and Electronic Calibrations

The problem:

To design an automatic testing device that will (1) determine the noise content of the many analog inputs of a data acquisition system and (2) determine whether the electronic calibrations (EC) on some data channels are operating properly. The two checks, Noise and EC, were previously accomplished under manual control using a digital to analog converter and a storage type oscilloscope. The Noise check had to be accomplished on anywhere from 50 individual channels to a maximum capacity of 400 individual channels depending on the test. The EC check had to be made on all channels that were expected to provide calibration data for data reduction use. The number of channels providing EC data can typically range from approximately 30 to 150 channels. This method of checking necessitated several operators, was very time consuming, and required a good deal of judgment on the part of the operators.

The solution:

An automatic Digital Noise Checker that performs the following:

1. Operates on-line using real time data.
2. Operates off-line using prerecorded check data.
3. Utilizes digital data rather than reconstructed analog data.
4. Sequences automatically through all system channels.
5. Prints on paper the channel, noise content, and a representative data value occurring in a number of samples for a Noise check.
6. Prints on paper the channels that EC in a predetermined selectable region for an EC check.

How it's done:

The Digital Noise Checker consists of four digital logic chassis, a control panel, a printer, and power supplies. The operation of the unit is set up to accommodate four operating modes. Modes 1 and 4 are provided for automatic Noise checks, Mode 2 is provided for the EC check. Mode 3 provides a multiplexer pattern sorting capability for the data acquisition system. The unit can accept inputs from either of two data acquisition recording systems by switch selection.

The unit uses a theory of limits to accomplish its tasks. The unit monitors the data samples from a single channel until the number of preselected samples have occurred and then advances control to monitor the data samples from the next channel that is sampled by the data acquisition system. The process is continued until all channels that are sampled have been monitored. Each time monitoring is completed for a channel, the results are printed, if printing is required by the processing, and manually selectable print options are available.

Notes:

1. It is anticipated that this unit will be used for the following:
   a. Perform Noise checks with results for all channels containing flags for noise levels above predetermined selected limits.
   b. Perform EC checks with a printout of the channels that have data falling within a predetermined selectable region.
   c. Sort multiplexer patterns for system setup use.
   d. Perform channel data histograms by printing out periodic data samples for a selected channel.

(continued overleaf)

e. Perform zero drift tests by printing out data values for all channels for repeated calibrate inputs.

f. Perform gain stability tests by printing out data values for all channels for repeated calibrate inputs.

2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B67-10467

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Joseph L. Harrold
and Carl F. Weegmann
(LEW-10173)