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December 1971

Brief 71-10502

NASA TECH BRIEF

Goddard Space Flight Center

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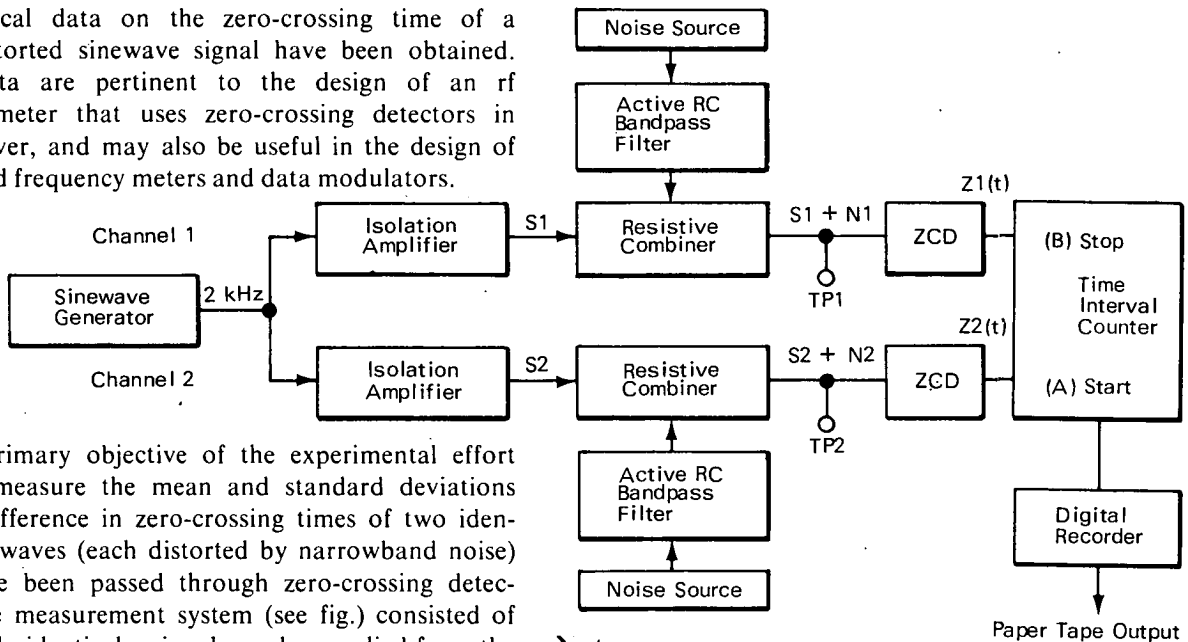
Statistical Measurements of the Zero-Crossing Time of a Noisy Sinewave

Statistical data on the zero-crossing time of a noise-distorted sinewave signal have been obtained. Such data are pertinent to the design of an rf interferometer that uses zero-crossing detectors in the receiver, and may also be useful in the design of phase and frequency meters and data modulators.



The primary objective of the experimental effort was to measure the mean and standard deviations of the difference in zero-crossing times of two identical sinewaves (each distorted by narrowband noise) that have been passed through zero-crossing detectors. The measurement system (see fig.) consisted of two nearly identical noise channels, supplied from the same signal source and fed into a digital counter. The counter operated in the time interval A–B mode; i.e., the relative time difference between the signals at inputs A and B was measured once each sample period.

The amount of variation in the measured time difference between the A and B waveforms was plotted, with the standard deviation σ and mean m (in electrical degrees) taken as a function of the signal-to-noise ratio (SNR). It was found that σ behaved much the same as the average value of the error, but that the deviation was approximately one order of magnitude larger.

Note:

Requests for further information may be directed to:

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Reference: TSP71-10502

Patent status:

No patent action is contemplated by NASA.

Source: S. T. Cost of
IBM Corp.
under contract to
Goddard Space Flight Center
(GSC-11004)

Category 02

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