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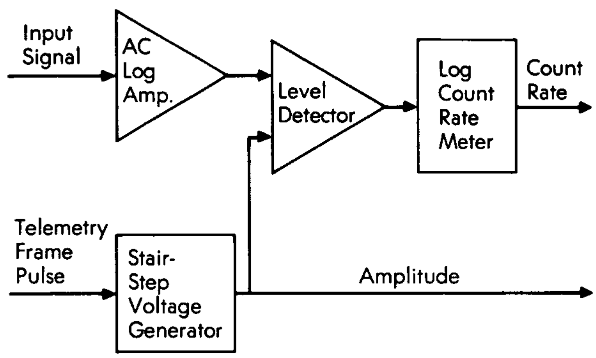
NASA TECH BRIEF

Ames Research Center

Lightweight, Broad-Band Spectrum Analyzer

The problem:

To design a lightweight, broad-band spectrum analyzer (100 Hz to 100 kHz) which can be incorporated into an electric field detector.



The solution:

A spectrum analyzer which utilizes techniques similar to those used to classify energy levels of nuclear particles.

How it's done:

The instrument is essentially an AC electrometer coupled to a spectrum analyzer. The analyzer consists of an AC quasilogarithmic amplifier, a level detector, a logarithmic count-rate meter, and a stair-step voltage generator. The level of the output from a broadband preamplifier (100 Hz to 100 kHz) is compressed by the log amplifier and fed to the level detector, which consists of a differential amplifier that compares the output level of the log amplifier with the DC level presented by the trigger-level generator. A count-rate meter counts the number of positive-going pulses corresponding to the log of the frequency of the pulses, and the output is proportional to the frequency of input signals exceeding the level determined by the trigger-level generator. Thus, as the triggering level is raised in a programmed sequence of steps, only the more energetic pulses are counted; the frequency content changes, and an integral spectrum is obtained. The stair-step generator is actuated by telemetry and provides a staircase of 16 DC levels.

The primary advantage of this spectrum analyzer is its ability to perform qualitative broad-band frequency analysis over a large dynamic amplitude range with minimum weight and electrical power requirements.

A modification of the established cordwood technique is incorporated into the fabrication of the analyzer; usually, components are sandwich-mounted between two Mylar wafers and then connected to a printed circuit board; in this design, an epoxy-fiberglass board is bonded to the Mylar wafer that normally contains the etched welding layout. Thus, instead of three separate parts to assemble, only the top Mylar wafer and the waferboard combination are involved. The epoxy board, which may be larger than the module, provides a durable surface in which to mount terminals, fasten supports, etc., and eliminates a number of connections that would otherwise have to be soldered.

Note:

Additional information may be obtained from:

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
Reference: TSP72-10060

(continued overleaf)

Patent status:

No patent action is contemplated by NASA.

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