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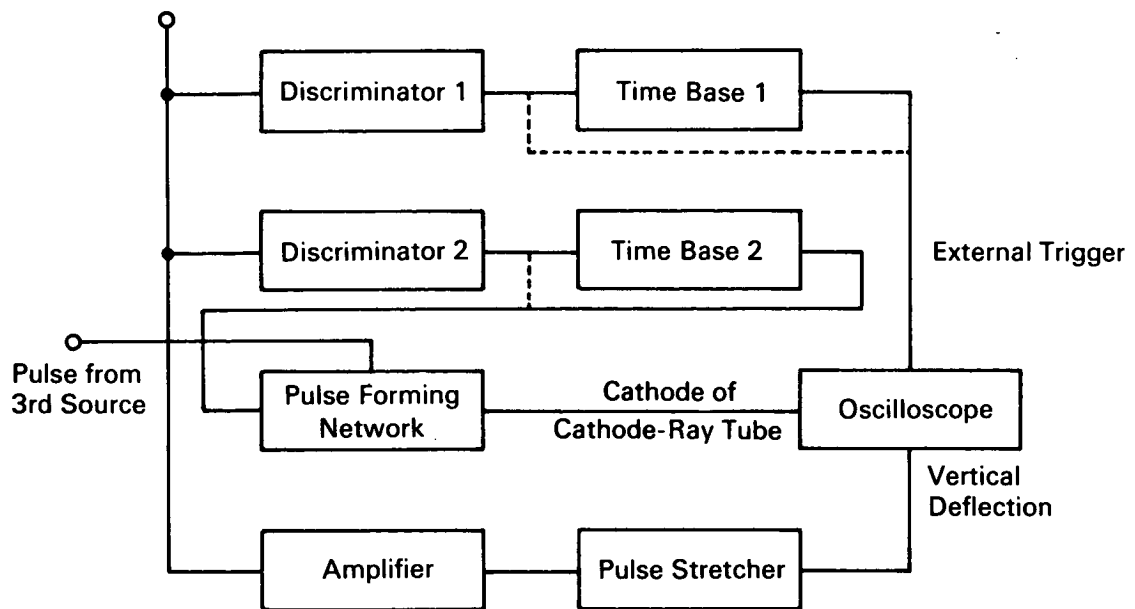
# NASA TECH BRIEF



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## Oscilloscope Used as X-Y Plotter or Two-Dimensional Analyzer

Square-Wave Input Pulse



An oscilloscope has been used as an X-Y plotter or two-dimensional analyzer with the capacity of tagging each point with a "yes" or "no", depending on a third parameter. A square-wave pulse that would normally appear on the scope is replaced by a single dot that appears at a point related to the amplitude and horizontal position of the trailing edge of the input square wave. The electronics design is such that the information-bearing dot lengthens to a dash in response to a second, and simultaneously occurring event. The length of this dash is adjustable relative to the sweep rate of the oscilloscope.

In operation, a square-wave pulse in a 50-ohm transmission line is applied to discriminator 1. Input to all the components in the diagram exhibits a very high input impedance level compared to 50 ohms. Discriminator 1 fires at a selected level on the leading edge of the input pulse and triggers time base 1. Discriminator 2 and time base 2 perform similarly but in response to a selected level on the trailing edge of the input pulse. Output of time base 1 triggers the oscilloscope sweep circuit while output of time base 2 triggers a pulse forming network that pulses the oscilloscope tube cathode. Should a pulse from a third

(continued overleaf)

source appear at the second input to the pulse forming network, the pulse applied to the cathode by time base 2 is lengthened by some adjustable amount. Following routing to the discriminators, the input pulse is applied to an amplifier and terminated in a 50-ohm load. Output of the amplifier is fed to a pulse stretcher having a time constant quite long compared to the oscilloscope sweep rate. The stretched pulse is applied to the vertical deflection circuit of the oscilloscope.

**Notes:**

1. When recorded photographically, the amount of data that can be distinguished per photograph is increased by at least two orders of magnitude over previous methods.

2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Lewis Research Center  
21000 Brookpark Road  
Cleveland, Ohio 44135  
Reference: B67-10269

**Patent status:**

No patent action is contemplated by NASA.

Source: David Hansen and Neal Roy  
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