Phase Matrix, Inc.
109 Bonaventura Dr. San Jose, CA. 95134
Toll Free: 1. 877. 4PhaseM www.phasematrix.com

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Using the EIP 585B/588B Pulse Counters for Radar Pulse Profiling

SCOPE: This bulletin describes how to use the EIP 585B/588B to profile radar pulse signals

Often it is necessary to know the frequency vs. time characteristic, or frequency profile, of pulsed RF signals. This is especially true when measuring linearity on chirp radar or the stability of klystron radar.

Profiling the frequency across the pulse of a radar or other pulsed signal is a simple task using an EIP 58XB pulse counter and a delaying pulse generator. The inhibit input on the counter allows the counter to measure frequency during a defined window in time. If this window is moved in defined increments, a "profile" of frequency across the pulse can be obtained.

The setup for making the measurement is shown in Figure 1. A sample of the pulsed radar is connected to the input of the counter. A transition corresponding to the beginning of the pulse is connected to the trigger input on the pulse generator. The output of the pulse generator is connected to the INHIBIT input on the counter. The INHIBIT input on the counter appears as 50 ohms to -2 volts and is driven by ECL levels. To drive INHIBIT from a 50 ohm source the source output must be set into a 50 ohm load to 0 volts for the inhibit level and -1 volt for the enable level. When this signal is connected to the counter the voltages become -1 and -2 volts, the proper voltages for driving INHIBIT.

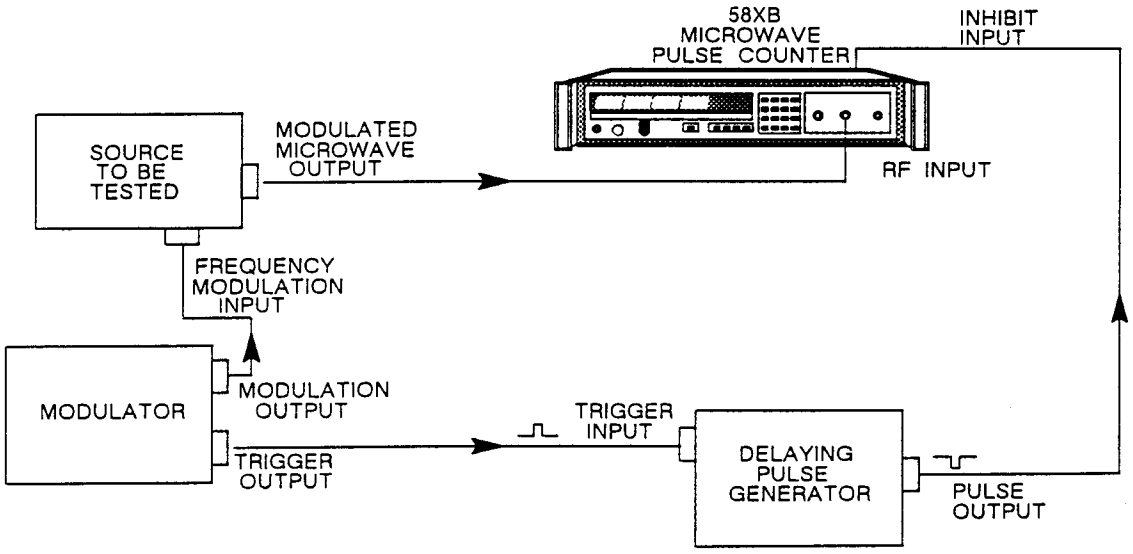

Figure 1. Setup for Using the Inhibit Input

The pulse generator is set to external trigger. The pulse generator width is set to the desired measurement window. The smaller the window the closer the measurement will be to a point in time, but the measurement will be less accurate. The best window width is the widest one that still gives the

desired time resolution. The delay of the pulse generator sets the point in time at which the measurement will be made. The delay of the pulse generator *must* be set so that the enable occurs within the RF pulse and at least 15 ns from the leading or trailing edges of the pulse.

The best method of ascertaining where the counter is measuring is to connect a sample of the envelope of the pulse to channel 1 of an oscilloscope and connect the gate output from the counter to channel 2 of the oscilloscope. For wide pulses the measurement point can be read from the oscilloscope. For precise timing, the delay of the gate signal and the cabling must be considered. The gate signal is delayed from the input by 90 ns. Most solid Teflon or polyethylene cable has a propagation delay of about 1.5 ns/foot. So for a setup such as Figure 2 the timing is: Gate output (as shown on the oscilloscope) – 90 ns – prop delay cable 1 + prop delay cable 2 – prop delay cable 3 = measurement point.

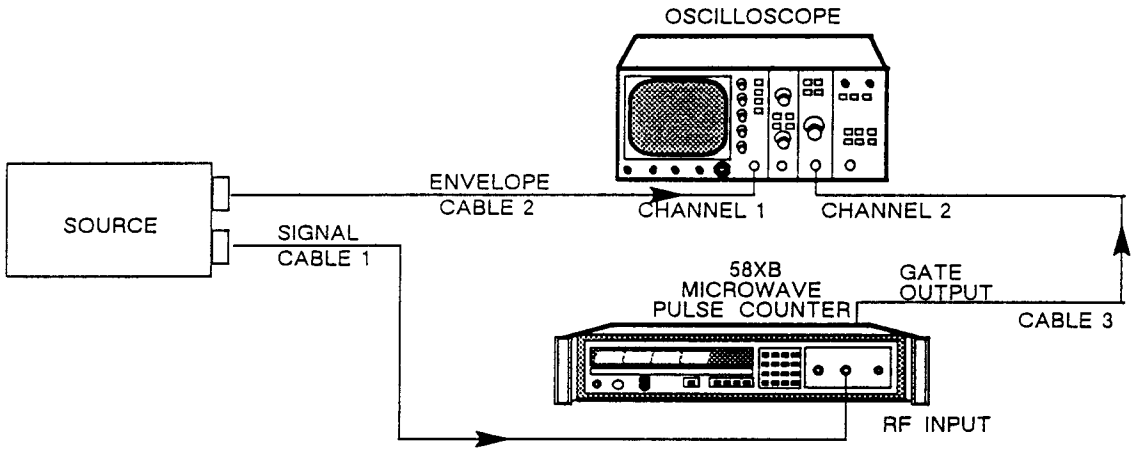

Figure 2. Setup for Determining Measurement Point

Because the INHIBIT input on EIP's 58XB pulse counter allows measurement during a defined window in time, profiling of pulsed signals is possible. Using the technique described above, profiling of pulsed signals, or any time varying signals, can be accomplished simply and easily.

Phase Matrix, Inc.
[illegible] Drive
San Jose, CA 95134 USA
Tel: 408.428.1000 Fax: 408.428.1500
www.phasematrix.com

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