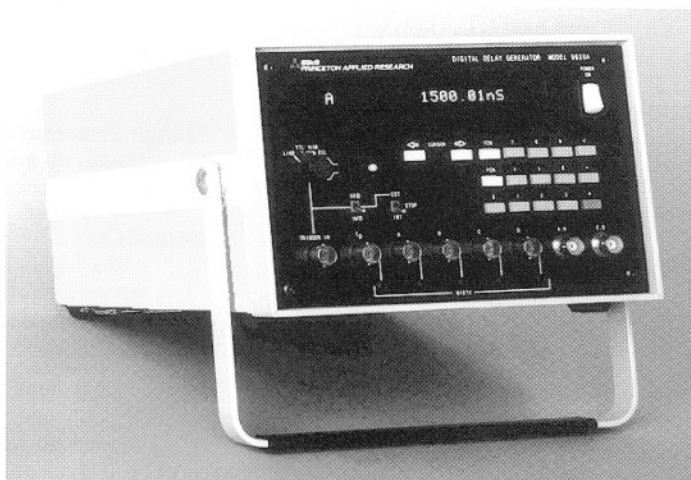


9650A

FOUR-CHANNEL DIGITAL DELAY GENERATOR



FEATURES

- $t = 0$ Output plus Four Individually Delayed Outputs
- Two Difference Outputs
- Variable Output Pulse Width
- 10ps Resolution
- Very Low Jitter

DESCRIPTION

The model 9650A will generate four adjustable-width output pulses, A, B, C and D, each of which can be delayed from a time datum by a predetermined amount. It also has two additional difference outputs, A.B and C.D, representing pulses which start on the rising edge of one output and finish on the rising edge of a second.

The instrument is triggered either by its own internal clock or by an external trigger and generates a timing pulse, T_0 , approximately 35ns later. This is the time datum to which all other outputs of the unit are referenced. The four delays are adjustable over the range 0 to 100ms with a 10ps resolution with the output pulse widths (A, B, C and D) being variable from 30ns to 1ms.

Operating modes include 'Scan', where continuously increasing delay times can be generated, and 'Burst' which is a special scan mode that will generate an output burst of pulses. The unit incorporates a 5 x 7 dot matrix alphanumeric display for setup purposes and a power shutdown memory to retain the current operating parameters. Up to 30 extra setup routines can also be stored for recall. All parameters are input through the front panel keys or through the (optional) computer interface.

The model 9650A is the ideal instrument for delaying trigger signals in signal recovery applications or for synchronizing multiple laser experiments where accurate time relationships are essential.

 **EG&G INSTRUMENTS**
Signal Recovery

9650A

FOUR-CHANNEL DIGITAL DELAY GENERATOR

SPECIFICATIONS

External Trigger

0 to 2MHz. Threshold variable from -2.8V to +3.0V in 200mV steps, positive or negative slope. Preset TTL, NIM and ECL switch selectable.
Input impedance 50Ω or 1MΩ in parallel with 15pF.

Internal Trigger

Single Shot or 0.001Hz to 999kHz. Three digit resolution from 1Hz to 999kHz, 0.001Hz resolution below 1Hz
Accuracy $\pm 0.1\%$
Jitter $< 0.2\%$ over 90% of range
Settling time < 2 seconds over 90% of range.

Triggers (general)

External or internal trigger rate should be
 $< 1/(\text{longest delay} + 330\text{ns} + \text{output pulse width})$ for delays up to 80μs and
 $< 1/(\text{longest delay} + 500\mu\text{s})$ for delays longer than 80μs.

Trigger Inhibit

Rear panel active low TTL input inhibits internal and external triggers.

Insertion Delay

35ns typical (from input trigger to T_0)

Delays

Four independent delays adjustable with respect to T_0 in the range 0 to 100ms.

Internal Timebase Stability

Standard $\pm 20\text{ppm}$ (0 to 50°C)
With option -/95 $\pm 0.3\text{ppm}$ (0 to 50°C)

Delay Accuracy

(delay) x (timebase stability) $\pm 0.3\text{ns}$

Jitter

Between the trigger or any output and the succeeding output
 $< 50\text{ps} + ((1 \times 10^{-8}) \times \text{delay})$

Output Pulse Widths

T_0 , A, B, C and D 30ns to 1ms (screwdriver adjustable)

A, B and C, D Minimum settable width for valid output: 5ns.
Pulse starts on rising edge of A (or C) and stops on rising edge of B (or D), with edges typically 1ns later than A (C) and B (D) leading edges when the latter are set to 5V output.

Output Levels

T_0 , A, B, C and D are low impedance outputs which generate +5V, +10V or -0.8V into 50Ω loads, with higher levels when terminated in higher impedances.
Typical pulse transition times when driving a 50Ω load:
+5V and +10V: 1ns risetime, 2.5ns falltime, $< 5\%$ under/overshoot
-0.8V: +300mV undershoot, 200mV overshoot

A, B and C, D are low impedance outputs which generate TTL levels into low or high impedance loads.

Typical pulse transition times for a 0.7V to 2.7V swing:

3ns risetime, 4ns falltime for a 50Ω load
2ns risetime, 3ns falltime for a 100Ω load.

Output Protection

Outputs are short circuit and overload protected and limit if the maximum aggregate current of all outputs averaged over 5ms exceeds 0.7A

Scan Mode

All four channels scan simultaneously with the same delay controlled by the following parameters:-

Initial Delay	0 to 80μs in 1ns steps
Triggers per Delay Step	1 to 49,999
Delay Step Size	0 to 80μs in 1ns steps
Delay Steps per Scan	1 to 899 subject to the overall restriction that the max delay in scan mode is 80μs.
Max trigger rate	20kHz. (external or internal)

Scan Inhibit

Rear panel active low TTL input inhibits outputs on completion of current scan.

Burst Mode

Special case of scan mode where Delay Step Size = 0. Allows the generation of 1 to 49,999 pulses using external or internal triggers at up to 20kHz. Use of scan inhibit input and internal triggers allows the unit to generate "n" pulses on receipt of a single trigger pulse.

Display

5 x 7 dot matrix alphanumeric vacuum fluorescent.

Setup Storage

The model 9650A automatically stores the current setup when power is removed and restores it when power is re-applied. Up to 30 additional setups may be saved for future use.

Computer Interface

The optional RS232 (-/96) or IEEE-488 (GPIB) (-/97) interfaces allow remote setting of the A, B, C and D channel delays, the internal rate generator, the scan parameters and both single and repetitive scans to be initiated or aborted. The IEEE-488 interface also allows these parameters to be read from the instrument.

Options

9650A/93	Rack Mounting Shelf (for one or two units)
9650A/94	5MHz External Trigger Option
9650A/95	0.3ppm Timebase Stability
9650A/96	RS232 Serial Interface (cannot be installed with 9650A/97)
9650A/97	IEEE (GPIB) Interface (cannot be installed with 9650A/96)
9650A/98	+15V Outputs (Increases +10V output pulse amplitude setting to +15V)

All specifications are subject to change without notice



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