

Model 745

250 fs Digital Delay Generator



FEATURES

- 4 or 8 Channel Options
- 250 Femtosecond Resolution
- Jitter < 5 picoseconds rms internal mode
- External Clocking (10MHz or 80MHz)
- Front Panel, Ethernet or Embedded Browser, USB,
- Burst, Gate, Trigger prescaler,
- Set, Store parameter

APPLICATIONS

- Component Testing
- ATE
- Laser Timing
- Precision Pulse
- Instrument Triggering

Description

The Model 745 Digital Delay Generator provides four independent delay channels (T1 to T4). The delay resolution is 250fs and external trigger channel jitter is less than 5ps (only in internal mode rms jitter). BNC outputs deliver 5V with a 600ps typical rise time into 50Ω. Amplitude and width are independently adjustable for each output pulse.

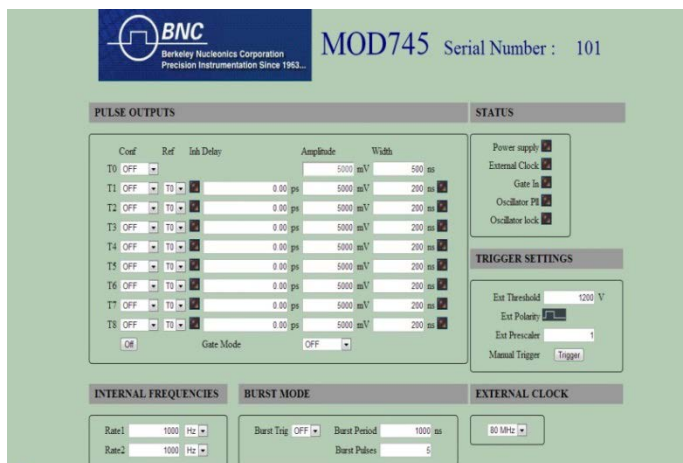
One input trigger (TRIG IN), or internal timer, or software command is used to trigger all output channels. A T0 output pulse marks zero delay for each trigger.

The Model 745 also provides four optional delay channels, T5 to T8, at the rear panel. These optional rear panel delay channels have a resolution of 1.25 ns.

Control Panel Web Page

This web page from an embedded Web Server in the Model 745 provides a simple method to configure settings for each channel (delay, output amplitude, output width), trigger source, trigger mode, and to control operation and status of the instrument.

The configuration information of the instrument is stored and saved in the Model 745. BNC's DDG-MUC software will allow control of up to 8 Model 745's on one GUI page.



Example of Model 745 Control Panel

Specifications

Delays

Channels	4 independent delay outputs
Range	0 to 20 seconds
Resolution	0.25 ps
RMS Jitter	25 ps + delay x 10 ⁻⁷ (external trigger to any output) 5ps for short delay (channel to channel)
Accuracy	< 250 ps + delay x 10 ⁻⁷
Time base	0.5 ppm stability

Trigger source

Internal	Two tunable Timers in Hz / ns 1 Hz to 1 MHz, 1Hz resolution 1μs to 4 seconds, 5ns resolution
External	Repetition rate < 1 MHz Trigger Prescaler: 1 to 2 ¹⁶ -1 Trigger level, from 0.1 to 5V / 50Ω Trigger slope: Positive or negative Minimum trigger delay < 60 ns

Software Command (From interface control)

Trigger mode	Single, repetitive or burst
Burst specs.	Pulse number: 2 to 2 ¹⁶ -1 Period: 1μs to 1s, 5ns resolution 5 V / 50 Ω, 200ns to 10μs width

Output T0

Output T1 to T4

Amplitude	2 to 5 V, 0.1 V resolution / 50 Ω
Width	100 ns to 10 μs, 5 ns resolution
Rise / fall time	600 ps typ. < 2 ns max / 5 ns
Connector	BNC

External time base (CLK IN)

Frequency	10 to 80 MHz, > 1V/50Ω
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Clock output

Frequency	10 MHz, +/- 1 V, square
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Gate input

Threshold	1.5 V
2 settings:	Global or individual channel
Gate source	Active high, Rep rate <100KHz

Store/Recall Mode

Up to 4 sets of parameters can be stored or recalled

General specifications

Size	176 x 128 x 35 mm
Power	50W (+12V, +5V)

Interface control

Ethernet, Internet or USB. Front panel

Option 1: 4 auxiliary delay channels (T5 to T8)

Delay

Channels:	4 independent delay outputs
Range:	0 to 20 seconds
Resolution:	1.25 ns
Jitter	< 50 ps rms + delay x 10 ⁻⁷ (external trigger to any output)
Accuracy:	1 ns + delay x 10 ⁻⁷

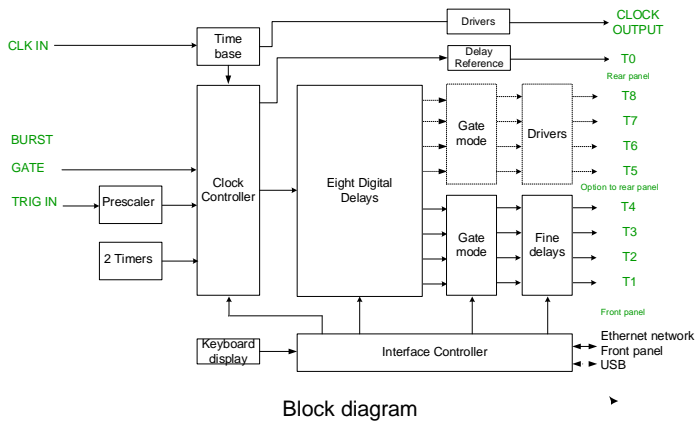
Output

Amplitude:	2 V to 5 V (common tuning)/ 50 Ω
Width:	100 ns to 10ms
Rise and fall time	< 5 ns

Option 2: OEM version

Option 3: Narrow pulse

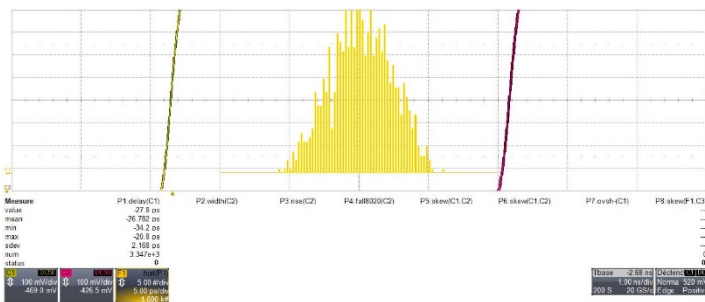
Block Diagram



Jitter (internal)

The Model 745 offers the world's lowest jitter in a programmable digital delay generator. The jitter for various delays is shown below

Delay setting	Jitter (ps rms)
< 100 ns	2.2
500 ns	2.7
1000 ns	2.7
2000ns	2.7



Programming

Direct Commands: Hyper-Terminal, PuTTY, Telnet (Linux, Windows, etc).

Virtual Instrument: Labview driver

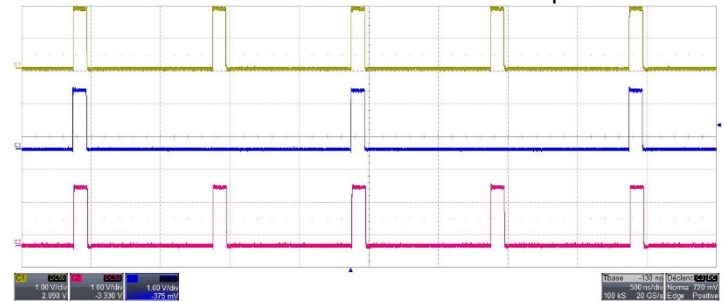
Embedded web server

Timer

Use the handy Timer function to generate various rates on different channels, for example:

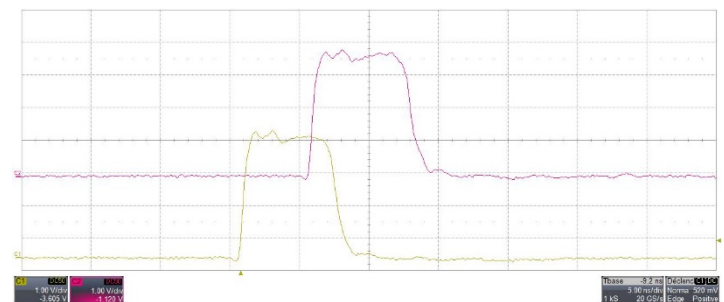
Channel 1, Channel 3 - 1.0 MHz internal rep rate

Channel 2 - 0.5 MHz internal rep rate



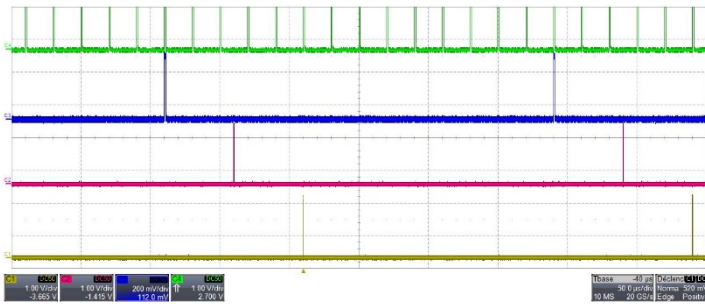
Generate Narrow Pulse

Use the Model 745 for Narrow pulses in addition to precise delays. Pulse width resolution is 250 femtoseconds. Widths of 10ns and 5ns are shown below:



Prescaler

Trigger prescaler allows the MOD745 to be triggered with a much faster source, but a sub multiple frequency:

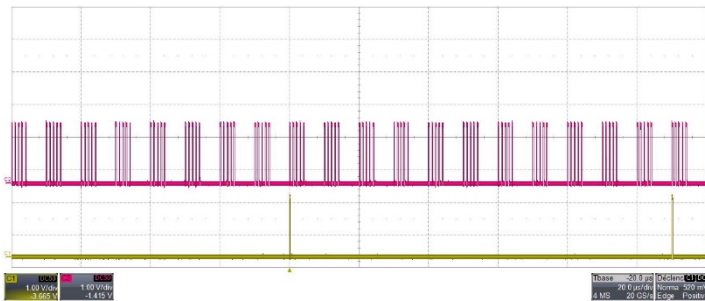


Prescaler = 9, delay channel 1 = 50 μ s, Channel 2 = 100 μ s

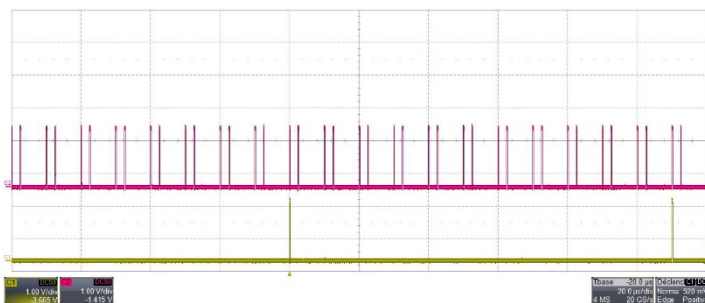
Burst mode

Each Channel can be independently set to Burst mode.

Example 1: Burst trigger has been set to internal trigger 100 kHz (IN1) and Burst pulse number to 5, and pulse period to 1000ns:

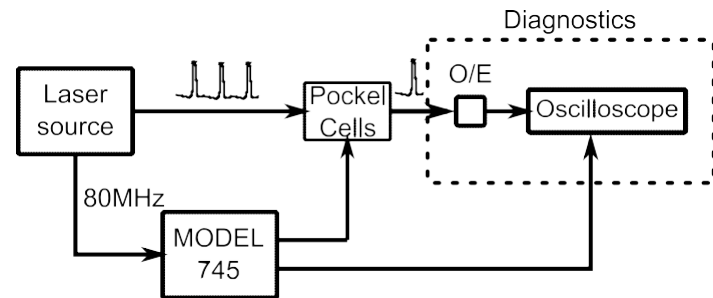


Example 2: Burst trigger has been set to internal trigger 100 kHz (IN1) and Burst pulse number to 2, and pulse period to 2500ns:

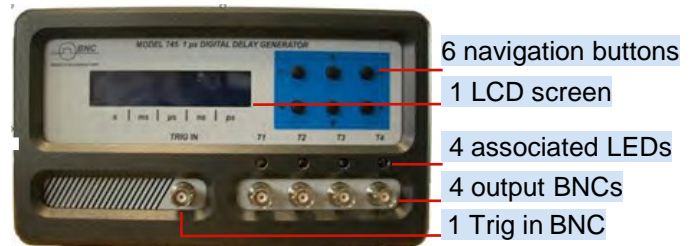


Burst mode

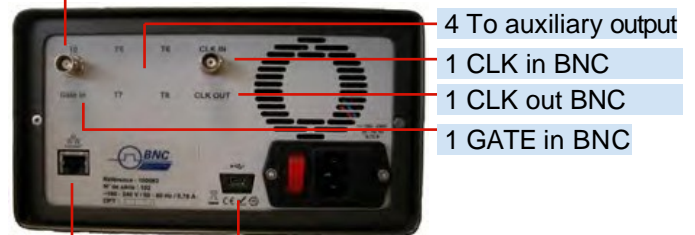
Application in Laser Timing



Front and Rear panel



1 To output BNC



Ethernet (RJ45) USB

Ordering Information

Model 745-4C-GOC-CLKIN	4 Channels Delay (250fs)
Model 745-8C-GOCC-CLKIN	Adds 4 Auxiliary Channels
Model 745-OEMC-CLKIN	745-OEM Model
Model 745-N	Narrow Pulse

P/N 745R1	19" Rack Mount Kit, Single Unit
P/N 745R2	19" Rack Mount Kit, Dual Units

Compliance

EMC Testing: EN61326-1:2006, EN62311:2008, CE / UL