Model 745
250 fs Digital Delay Generator

FEATURES

- **4 or 8 Channel Options**
- **250 Femtosecond Resolution**
- **Jitter < 5 picoseconds rms internal mode**
- **External Clocking (10 MHz or 80 MHz)**
- **Front Panel, Ethernet or Embedded Browser**

APPLICATIONS

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

New Functionality:
burst, gate, trigger prescaler,
1.25 ns resolution ATx, set/store parameter

BNC Berkeley Nucleonics
Test, Measurement and Nuclear Instrumentation since 1963

コーンズ テクノロジー株式会社

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 50ohms. 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 T_0 output pulse marks zero delay for each trigger.

The Model 745 also provides four optional delays channels, T5 to T8, at the rear panel. These optional rear panel delay channels have a resolution of 1.25 ns and trigger jitter less than 50ps rms.

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.
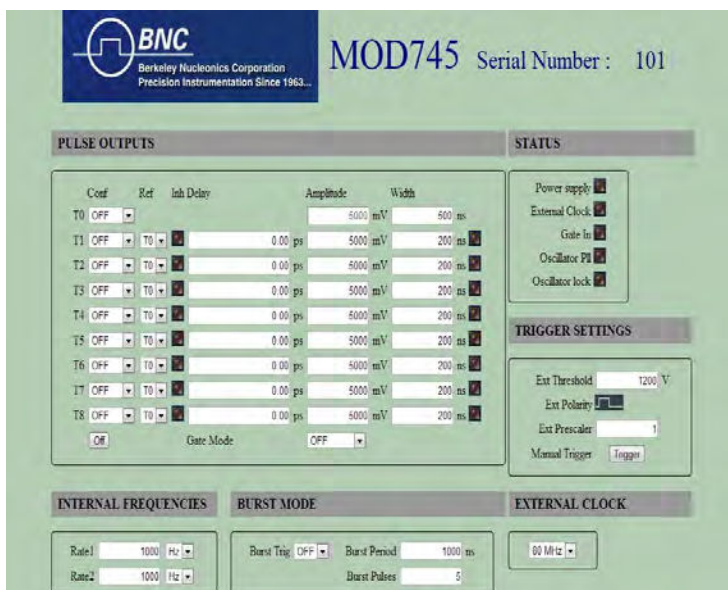
Example of Model 745 Control Panel

Specifications

Delays

Channels	4 or 8 independent delay outputs
Range	0 to 20 seconds
Resolution	250 fs
RMS Jitter	25ps rms + delay x 10^{-7}(external trigger to any output)
	20ps rms + delay x 10^{-7}(channel to channel)
	< 5ps rms for short delay (channel to channel)
Accuracy	< 250ps + delay x 10^{-7}
Time base	200 MHz, 0.5 ppm stability

Trigger source

Command	Front panel/ Ethernet
Internal Load	50Ω
Ext. Rep rate	< 1 MHz
	Trigger level, from 0.1 to 5V,
	Internal load: 50Ω
Trigger Slope	Positive or Negative, Selectable
Min Trigger Delay	< 60 ns

Trigger mode One Shot, Repetitive

Output T_0 5 V/50Ω, 100 ns -10 us (rear panel)

Output T1 to T4

Amplitude	2 to 5 V, step < 0.1 V
Width	100 ns to 10 μs , step: 5 ns, 5 ns combined channel (optional)
Load	50 Ω
Rise Time	< 2 ns (600 ps typical)
Fall Time	< 5 ns
Connector	BNC on front panel
Clock Input	User Specified, settable at factory (between 10 MHz to 80 MHz)

External Time Base (CLK IN)

Frequency	10 or 80 MHz

General Specifications

Size	8.5 x 9.7 x 5.4 Inches
Power	50W, 110V-240V

Interface Control

Front panel, Web page from embedded web server for IE, Firefox, Chrome and Ethernet network

Options

Option 8C - Additional Delay Channels (T5, T6, T7, T8)

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}
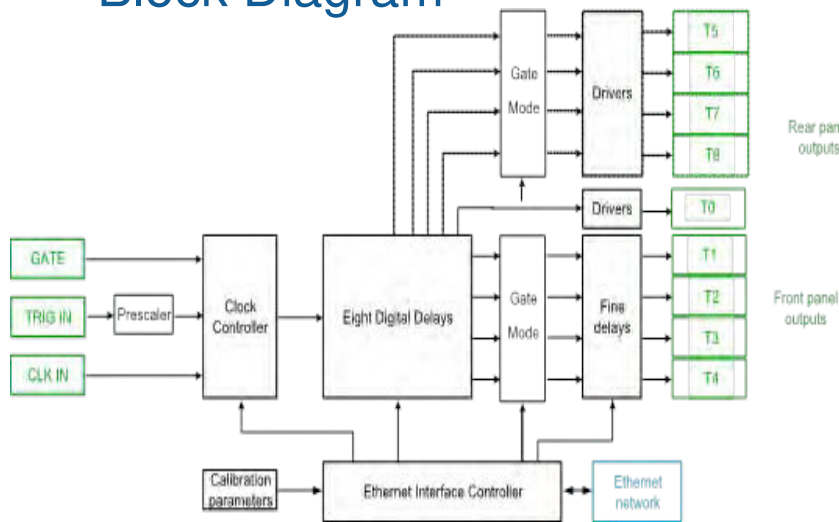
Amplitude: 2 - 5V

Width: 10 ns to 10 ms

Load: 50 Ω

Rise, Fall time < 5 ns

Connector: BNC on rear panel

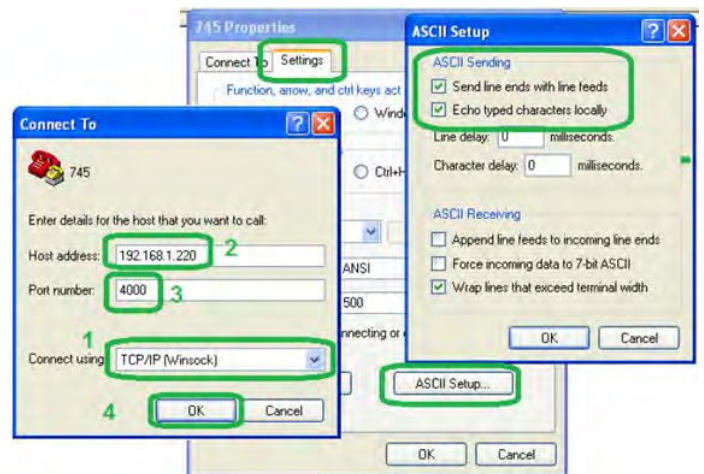Option GOC - Gate input, clock output (10MHz 1V, Square), High Stability Timebase (50ppb)

Block Diagram
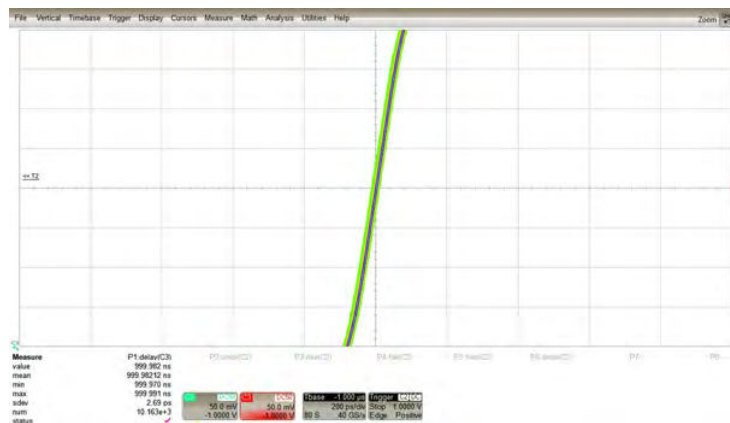

Jitter (internal)

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

Delay Setting	Jitter (ps rms)
100 ns	2.6
500 ns	2.7
1000 ns	2.7
2000 ns	2.7

2.6ps Jitter Shown Above

Programming Options

Direct Commands: Hyper-Terminal, PuTTY, Telnet (Linux, Windows, etc). **Virtual Instrument:** Labview

Image 1   745-hyper

Image 2   745-labview
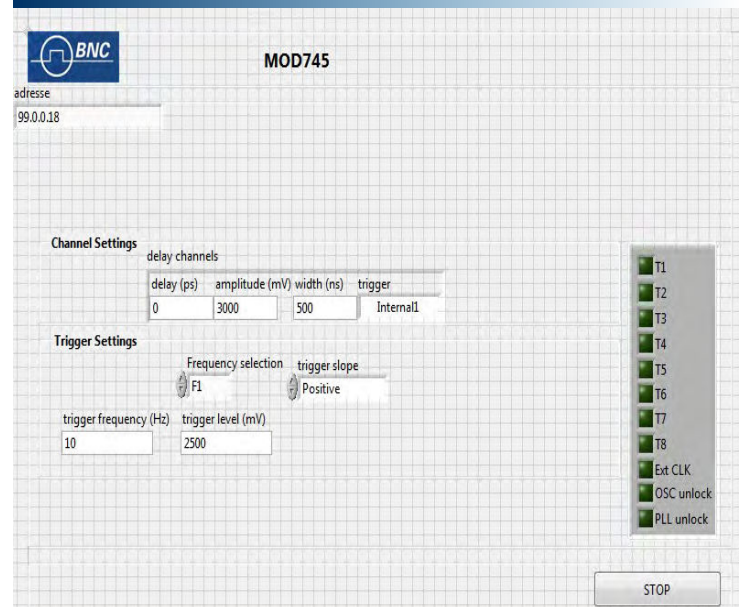
Applications in Laser Timing

Diagnostics

Laser source → Pockel Cells → O/E → Oscilloscope
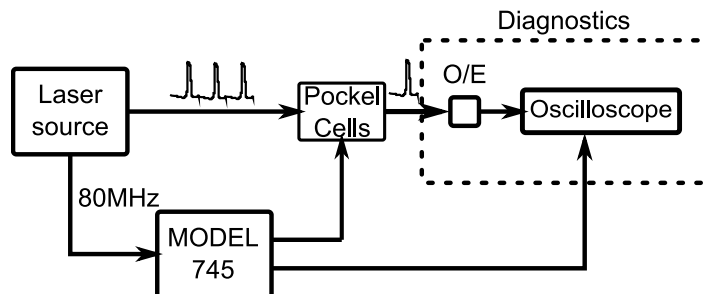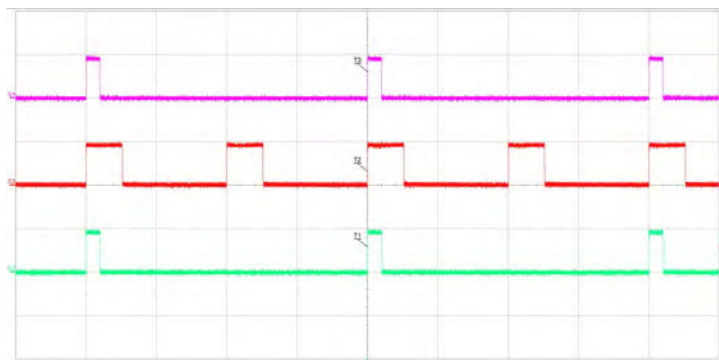
80MHz → MODEL 745

Rate Divider

Use the handy rate divider function to generate various rates on different channels.

Shown below:

| Channel 2 | - 1.0 MHz internal rep rate |
| Channel 1, Channel 3 | - 0.5 MHz internal rep rate |

745 Front and Rear Panel

6 navigation buttons
1 LCD screen
4 To associated LEDs
4 To output BNCs
1 Trig in BNC

1 To output BNC
4 auxiliary To (opt)
1 CLK in BNC
1 CLK out (opt)
1 GATE in (opt)
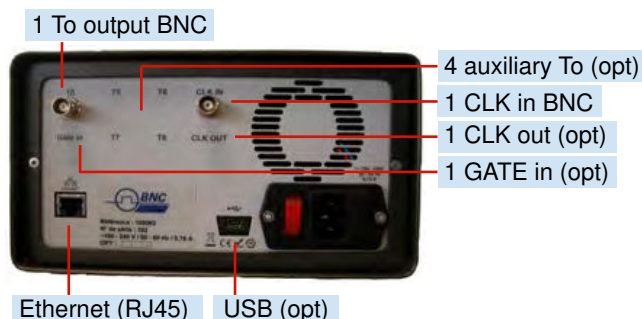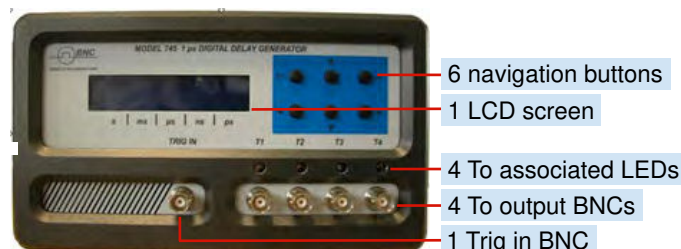
Ethernet (RJ45)   USB (opt)

Generate Narrow Widths

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:
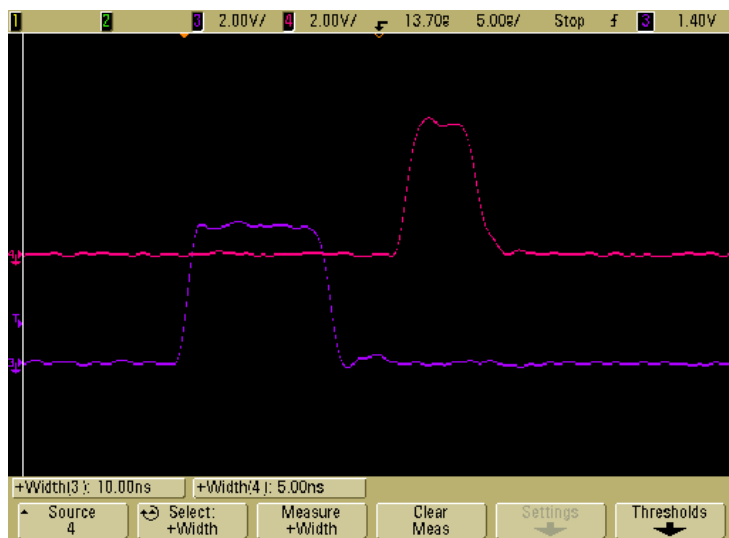
Ordering Information

Model 745-4C	4 Channels Delay+Width (250fs)
Model 745-4C-GOC	Adds Gate Input, Timebase Stability, Clock Out
Model 745-8C	Adds 4 Auxillary Channels
Model 745-8C-GOC	Adds 4 Auxillary Channels, Gate Input, Timebase
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