



With GREENFIELD TECHNOLOGY

Model 745 4/8 Channel Pulse & Delay Generator

FEATURES

- Four high-resolution delay channels
1 ps resolution
< 5 ps RMS jitter (at short delay)
> 20-second delay range
- Adjustable outputs (amplitude 2 to 5 V and width 100 ns to 10 μ s). 1 ns rise-time, $\leq 50\Omega$
- Triggers: Burst, Gate, External trigger pre-scaler, Internal frequency generators
- External clock: 10 MHz or 80 MHz
- Compact packaging
- All parameters may be controlled via the front panel, Ethernet or Internet, or USB
- Option: Four auxiliary delay channels

APPLICATIONS

- Component Testing
- ATE Applications
- Laser Timing Control
- Laser Pulse Picking
- Precision Pulse
- Instrument Triggering



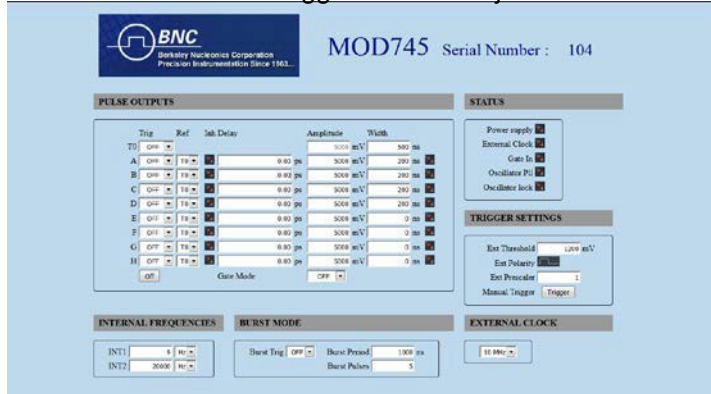
DESCRIPTION

The Model 745 generator provides four independent delay channels (T1 to T4) on the front panel. The delay resolution is 1 ps, and the external trigger-to-channel jitter is less than 25 ps. BNC output connectors deliver 5 V, 1 ns rise-time, at 50 Ω . Amplitude and width are adjustable for each output pulse.

One input trigger (TRIG IN), or two internal synchronized timers, or software commands may be used to trigger all output channels.

A T0 output pulse (marking zero delay reference) is generated at each selected trigger.

The Model 745 also provides (as an option) four auxiliary delay channels T5 to T8 on the front panel. The delay resolution is 1.25 ns and trigger-to-channel jitter is less than 50 ps.



Example of Model 745 control panel

Control Panel Web Page:

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

The configuration information of the instrument is stored and saved in the Model 745 (up to 4 different sets of unit configuration can be stored/recalled).



Model 745

4/8 Channel Pulse & Delay Generator

SPECIFICATIONS

Delay (channel T1 to T4)

Number	4 independent
Range	0 to > 20 seconds
Resolution	1 ps
RMS Jitter	25 ps + delay x 10^{-8} (external trigger to any output) 15ps + delay x 10^{-8} (internal trigger to any output)
Accuracy	< 250 ps + delay x 10^{-8}
Time base	0.05 ppm stability

Output pulse (channel T1 to T4)

Amplitude	2 to 5 V, resolution < 0.1 V / 50 Ω
Width	100 ns to 10 μ s, 5 ns resolution
Rise / fall time	< 1 ns / < 3 ns
Connector	BNC on front panel

Trigger source

Command	Front panel / Ethernet / Internet / USB
Internal	2 generators, f= 0.25 Hz to 1 MHz
External	Repetition rate < 1 MHz Trigger prescaler: 1 to $2^{16}-1$ Trigger level: from 0.1 to 5 V / 50 Ω Positive or negative slope Minimum trigger delay < 65 ns

Trigger mode Single, Repetitive, or Burst

Burst mode

Pulse number	1 to $2^{16}-1$
Range	1 μ s to 1 s, 5 ns resolution

Output T0 5 V / 50 Ω , 200 ns width

Connector BNC on the rear panel

Gate input

Threshold	1.5 V
Polarity	Active high
Function	Output inhibit (Global or individual channel)

Clock IN

Frequency	10 MHz (up to 100 MHz as an option)
Min level	-3 dBm
Shape	Sine wave or square
Threshold	0 V, internal load, AC

Clock OUT

Frequency	10 MHz
Level	+/- 1 V, $\leq 50 \Omega$
Shape	Square
Load	50 Ω external

User memory

Up to 4 sets of parameters can be stored/recalled via the front panel, Ethernet or USB

General specifications

Size	215 x 245 x 135 mm
Power	50 W – 110 to 240 V

Interface control

Front panel
Web page from an embedded web server. Compatible with IE, Firefox, Chrome
USB (serial communication)
Ethernet link

Options

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

Delay channel

Number: 4 independent
Range: 0 to > 20 seconds
Resolution: 1.25 ns
Jitter < 50 ps RMS + delay x 10^{-8} (external trigger to any output)
Accuracy: 1 ns + delay x 10^{-8}

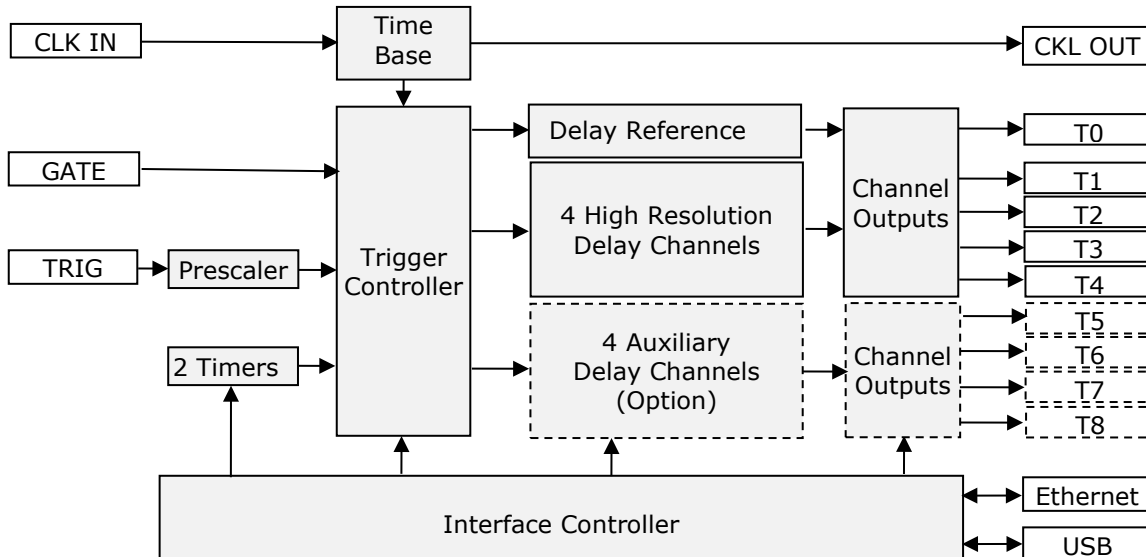
Output pulse

Amplitude: 5 V / 50 Ω , common tuning
Width: 100 ns to 10 ms, 5 ns resolution
Rise and fall time: < 5 ns
Connector: BNC on front panel

Option 2: up to 100 MHz clock Input (or Output)
(request when ordering from factory)

FUNCTIONAL OVERVIEW

Block diagram



Time base

The time base is provided from an internal clock reference or an external 10 MHz clock (CLK IN). As an option, the external clock can be up to 100 MHz. The time base is available on the rear panel (CLOCK OUT)

Delay channel

There are four independent delay channels. The delay from the selected trigger source is adjustable up to 20 seconds in 1 ps increments.

Jitter: The following chart indicate typical RMS jitter at various delays:

Internal Trigger Mode	External Trigger Mode
Delays < 100 ns: 5 picoseconds	Delays < 100 ns: 5 picoseconds
Delays > 100 ns: 15 picoseconds + time base	Delays > 100 ns: 25 picoseconds + time base

Triggering

The Model 745 offers users several methods for triggering delay channels:

- Externally trigger on the positive or negative slope of your trigger signal and selected level from 0.1 V to 5.0 V.
- Two internal generator triggers are adjustable from 0.25 Hz to 1 MHz in 1 Hz increments (5 ns).
- Software trigger from remote command

Trigger Modes

Burst mode: pulse number 1 to $2^{16}-1$, period 1000 ns to 1 second (depending on the trigger rate)

Trigger Pre-scaler: pre-scaler value applied to the external trigger goes from 1 to $2^{16}-1$

Gate mode: can be set to global or individual channel.

Outputs

On the front panel, each delay channel output pulse is independently adjustable in level and width. The outputs are designed to drive an external 50 Ω load.

T0 Output pulse is a time reference that marks zero delay.

Interface Control

All parameters may be locally controlled via touch screen or remotely controlled via Ethernet or USB.

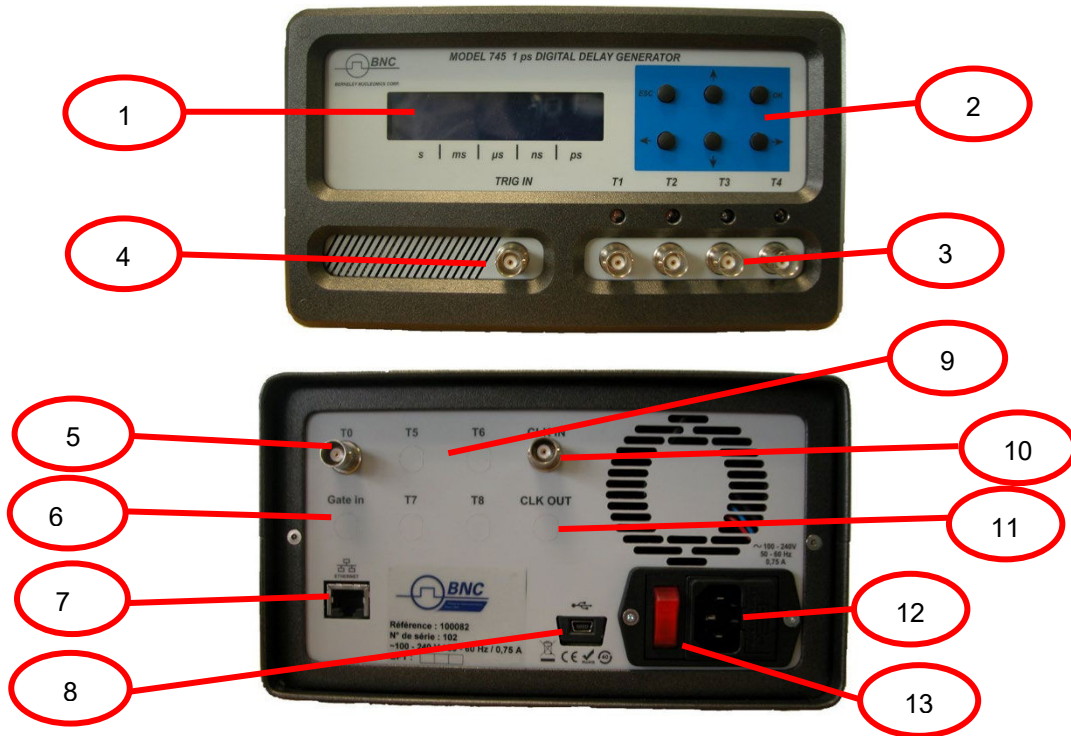
Model 745 has an embedded control interface software that allows all parameters to be controlled by any PC with a browser. You will need to enter the unit's IP address into the browser after connecting a cable from the Ethernet port to your computer network. The browser will automatically open a virtual control panel on the PC. The instrument displays its IP address on the front panel.



Model 745 4/8 Channel Pulse & Delay Generator

INPUT / OUTPUT INTERFACE

Front and Rear Panel



Connectors, Switches, Indicators

Front Panel			Rear Panel		
1	LCD screen	For local control	5	T0	T0 output: BNC connector
2	Push button	For local control	6	GATE	Gate input: BNC connector
3	T1, T2, T3, T4	Pulse outputs: BNC connector	7	Ethernet	Ethernet: RJ45 connector
4	TRIG	Trigger input: BNC connector	8	USB	USB interface: micro-USB connector
			9	T5, T6, T7, T8	Auxiliary outputs: BNC connector
			10	CLK IN	Clock input: BNC connector
			11	CLK OUT	Clock output: BNC connector
			12	PLUG	AC power plug (90-240 V)
			13	POWER	Power ON/OFF switch

ORDERING INFORMATION

Model	Description
Model 745	Base version: 4 high-resolution delay channels
Model 745-8C	Adds 4 auxiliary channels
Model 745-RM1	19" Rack mount kit, Single unit
Model 745-RM2	19" Rack mount kit, Dual units
Model 745-OEM	OEM version (board level) of the Model 745