Low Jitter Digital Delay & Pulse Generators

**BNC**

Berkeley Nucleonics Corporation

| B N C | m o d e l s | 565/505 |
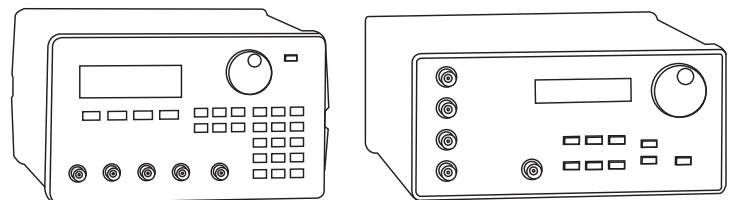
Performance • Versatility • Affordability

## 565 AND 505 LOW JITTER DIGITAL DELAY AND PULSE GENERATORS

Models 565 and 505 expand the boundaries of pulse generator and digital delay capabilities. They provide up to eight independent pulse generator outputs or up to 16 digital delay generator edges in one instrument. As a pulse generator they provide rate, delay, width, and output adjustability with each of the channels. As a digital delay generator with fine resolution timing they provide multiple pulses from an external, internal, or software trigger.

The outputs are synchronized to one another with a coherence of 250 ps and 5 ns respectively. A channel's timing can be referenced to any other channel or the zero delay point ($T_o$). These edges are adjustable in 500 ps steps or 100 ns respectively. Channels can be selectively gated and enabled/disabled. Any channel can be a submultiple (divide by n) of any other channel. The burst mode allows an independent number of bursts for any channel. Each channel possesses separate output level and polarity characteristics. The units come with RS232, GPIB, USB and/or Ethernet programming and the ability to store several complete sets of parameter settings for future recall. The 565 can combine the timing of several channels so complex patterns such as barcodes and complex control signals can be generated.

## 565 AND 505 >>> KEY FEATURES

• Single cycle by pushbutton or trigger >>> One pulse with each pushbutton, internal, external or software trigger
• Internal rate generator >>> Period adjustment provides finer resolution than pure rate
• Delay and width for each channel >>> No longer need to combine two channels to generate widths
• Complete setup stored inside the instrument >>> Recall frequently applied testing configurations
• Programmability >>> The 565 has RS232, GPIB, and USB standard with optional Ethernet communication.
 The 505 has RS232 and GPIB.

## CHANNEL PROPERTIES >>> PROVIDES NEW OPERATING MODES

• Burst – each channel can have a separate number >>> Burst is selectable on a channel-by-channel basis
• Duty cycle – N pulses on, M pulses off >>> Duty cycle is selectable on a channel-by-channel basis
• Divide by N – a pulse every N master pulses >>> By using the duty cycle mode
• Gate – an external signal enables pulses >>> Channels can be selected to respond to or ignore the gate
• Combine – several channels >>> Selectively sum the timing of several channels onto one channel



| M O D E L | 565 |

500PS RESOLUTION • 250 PS CHANNEL-TO-CHANNEL JITTER

MODEL 565 - X - Y ORDERING INSTRUCTIONS:

X is number of channels (select 2c, 4c or 8c)
Y is 565-specific options (H for 35V outputs**, E for Ethernet interface*)
19" Rack Mount for Model 565 - Order P/N 6923
3 year service and calibration agreement - Order P/N 8000-3
* Ethernet communication option replaces USB port on rear panel
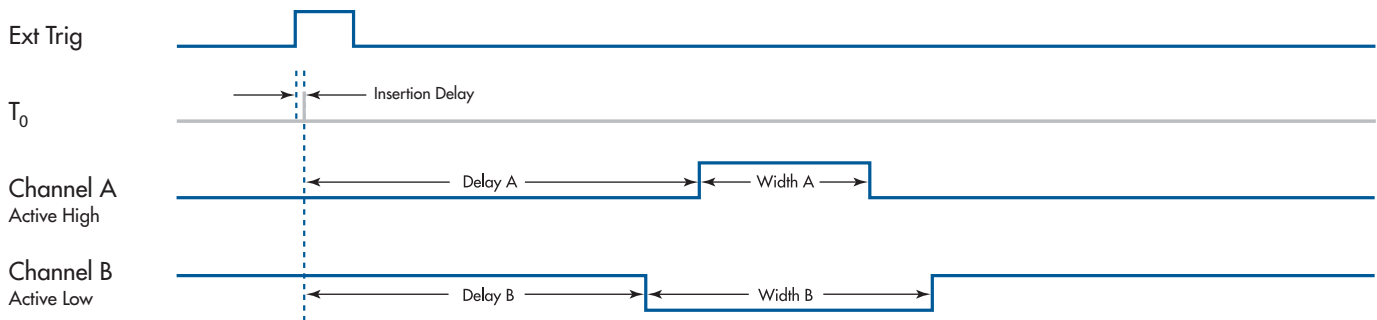** Additional High Voltage output on rear panel



| M O D E L | 505 |

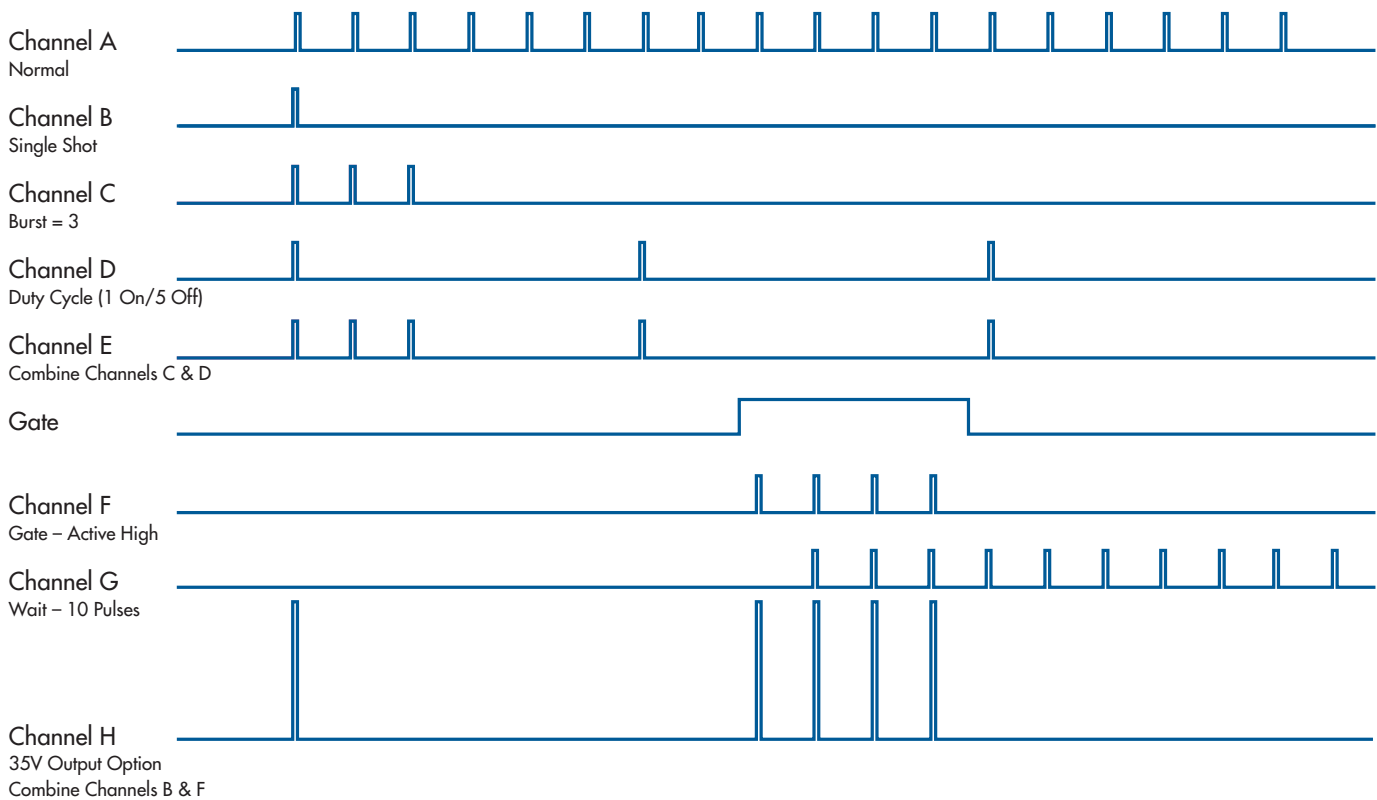100NS RESOLUTION • 5 NS CHANNEL-TO-CHANNEL JITTER

MODEL 565-X ORDERING INSTRUCTIONS:

X is number of channels (select 2c, 4c or 8c)
USB, E and H options are not available on 505
19" Rack Mount for Model 505 - Order P/N 6914
3 year service and calibration agreement - Order P/N 8000-3

**BNC**

- SYNCHRONIZE, TRIGGER, DELAY, AND GATE MULTIPLE EVENTS
- INDEPENDENT CHANNEL PROPERTIES FOR UP TO EIGHT CHANNELS
- INDEPENDENT BURST, GATE, OUTPUT CHARACTERISTICS
- DELAY AND WIDTH CONTROL FOR EACH CHANNEL

## DIGITAL DELAY USING EXTERNAL TRIGGER

Ext Trig

$T_0$ — Insertion Delay

Channel A
Active High — Delay A — Width A

Channel B
Active Low — Delay B — Width B

## CONTINUOUS RATE CHANNELS IN SEPARATE MODES

Channel A
Normal

Channel B
Single Shot

Channel C
Burst = 3

Channel D
Duty Cycle (1 On/5 Off)

Channel E
Combine Channels C & D

Gate

Channel F
Gate – Active High

Channel G
Wait – 10 Pulses

Channel H
35V Output Option
Combine Channels B & F

| | M O D E L 565 | M O D E L 505 |
|---|---|---|
| **CONFIGURATION** | 2, 4, or 8 channels of delays and widths per instrument | 2, 4, or 8 channels of delays and widths per instrument |

## TIMING DELAYS AND WIDTHS

| | | |
|---|---|---|
| **delay** | 0 to 1000 seconds with 500 ps resolution | 0 to 1000 seconds with 100 ns resolution |
| **width** | 10 ns to 1000 seconds with 500 ps resolution | 100 ns to 1000 seconds with 100 ns resolution |
| **accuracy** | 1 ns + 0.0001 x time | 10 ns + .0001 delay |
| **time base** | 100 MHz, 25 ppm crystal oscillator | 50 MHz, 50 ppm crystal oscillator |
| **RMS jitter** | 250 ps | < 5 ns |

| **TRIGGER MODES** | Continuous, External Trigger, External Gate, Single Shot, Burst, Duty Cycle | |

## EXTERNAL TRIGGER/GATE

| | | |
|---|---|---|
| **rate** | 0 to 5 MHz | 0 to 2 MHz |
| **insertion delay** | < 150ns | < 250ns |
| **threshold** | 200 mV - 15 V | 200 mV - 15 V |
| **trigger slope** | Rising or falling edge, selectable | Rising or falling edge, selectable |
| **gate** | Active low or active high, selectable | Active low or active high, selectable |
| **impedance** | 1000 ohms | 1000 ohms |

## INTERNAL REP RATE GENERATOR

| | | |
|---|---|---|
| **rate** | 0.0002 Hz to 5 MHz | 0.001 Hz to 2 MHz |
| **accuracy** | 1 ns + 0.0001 x period | 5 ns + 0.0001 x period |
| **RMS jitter** | 250 ps | < 500 ps |
| **burst mode** | 1 to 1000000 pulses | 1 to 1000000 pulses |

| **SINGLE SHOT** | Pushbutton provides a single trigger | Pushbutton provides a single trigger |
|---|---|---|
| **BURST** | Any channel may provide a burst of pulses at the internal rate. The number of pulses may differ from channel to channel. | |
| **DUTY CYCLE** | Set timing events at ON for M pulses and then OFF for N pulses. Set M to 1 and N to (n-1) to get "divide by N" operation. | |
| **OUTPUTS** | Selectable, a fixed amplitude TTL/CMOS or adjustable level to 12 V, Optional 35 V output (contact factory). | Adjustable to 20 V |
| **OUTPUT IMPEDANCE** | 50 ohm | 50 ohm |

## ADJUSTABLE AMPLITUDE

| | | |
|---|---|---|
| **slew rate** | >.2 V/ns | >.2 V/ns |
| **amplitude** | 1 V - 6 V into 50 ohm load | 1 V - 10 V into 50 ohm load |
| | 2 V - 12 V into high impedance | 2 V - 20 V into high impedance |
| **peak current** | 150 mA per channel | 150 mA per channel |
| **average current** | 200 mA ave. (total for all channels) | 200 mA ave. (total for all channels) |
| **polarity** | Positive (active high) or Negative (active low) | Positive (active high) or Negative (active low) |

## TTL / CMOS

| | | |
|---|---|---|
| **transition time** | < 5 ns | n/a |
| **amplitude** | 4 V nominal | n/a |

## COMPUTER INTERFACE

| | | |
|---|---|---|
| **RS232** | 4800, 9600, 19200 & 38400 | 4800, 9600, 19200 & 38400 |
| **IEEE 488** | Standard | Standard |
| **USB** | Standard | n/a |
| **Ethernet** | Optional | n/a |

## MODEL SELECTION

| | | |
|---|---|---|
| **model 565-2C/505-2C** | 2 Channels | 2 Channels |
| **model 565-4C/505-4C** | 4 Channels | 4 Channels |
| **model 565-8C/505-8C** | 8 Channels | 8 Channels |
| **OPTIONS** | 35 V High Voltage Outputs | n/a |
| **ACCESSORIES** | 19" Rack Mount | 19" Rack Mount |
| | Extended service/calibration agreements available | Extended service/calibration agreements available |