



Berkeley Nucleonics  
Corporation

Model 725 Multi-Trigger Digital  
Delay Generator  
User Guide

Documentation for the Model 725  
and **timerPRO** Software







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## Basic Functions

The Model 725 provides eight functional **channels**, or internal signal paths.

At any time, each channel can be assigned one of eight **timing modes**. Timing modes include clocks, counters, delayed pulses after triggers, etc. You can set various **properties** for each timing mode—for example, the delay length on a Delayed Pulse After Trigger. All modes are aligned to a precise, 100 MHz internal **clock or an external clock**

## Setting Up the Model 725

1. Plug the power cable from the back of the Model 725 into a 100–250 VAC power outlet.
2. Connect the 9-pin cable to the back of the Model 725 and to a free serial port on the PC.
3. Press the Power button on the front of the Model 725.
4. From your computer, run timerpro.exe to launch **timerPRO**.
5. From within **timerPRO**, select **Communications**.

## Field Upgradeable Software

The firmware in the Model 725 is field upgrad



## OVERVIEW OF MODEL 725 CONTROLS

The Model 725 is the control unit and interface for your experimental equipment. You will program it using the **timerPRO** software. Once you've designed, tested and downloaded your program, you can control the Model 725 from the computer, or you can run it in stand-alone mode.

Indicators and controls on the Model 725 front panel will help you

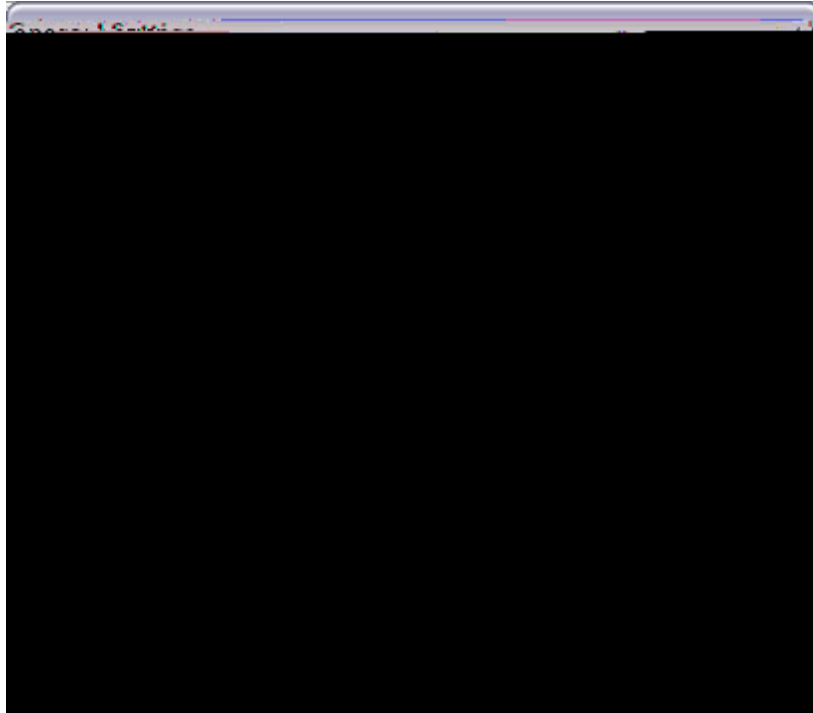






## General Settings

The **General Settings** screen lets you control functions that affect all channels of the Model 725. To reach this screen, click the **General Settings** button, or choose **Channel>General**.



## Disable/Enable I/O

On occasion you will need to abort an experiment or quickly place all outputs to your equipment in a “safe” state. Each of the tabs of the General Settings screen includes buttons that let you “disable” and “enable” all inputs and outputs to the Model 725. With I/O disabled, input signals are ignored. Each output will be held at either a logic low or logic high, depending upon its channel properties. We’ll refer to the “safe” voltage that a channel produces when disabled as the “quiescent state” (see *Channel Properties: Quiescent States*). To restore channels functions, click the **Enable I/O** button. These functions are nonvolatile: the enabled and disabled states are restored on power cycle.

You can also disable or enable inputs and outputs from the Model 725 front panel (see *Experimenting: Disable/Enable All*).

## Lock/Unlock Panel

Lock or unlock the front panel buttons using the **Lock Panel** and **Unlock Panel** buttons. This functionality is handy, for example, in an embedded control application where the Model 725 should function only in stand-alone or computer-controlled modes. When the panel is locked, the LED next to the power button glows a steady red and all buttons are dark. When the panel is unlocked, the power LED glows green and the front-panel buttons are illuminated.

Like the enable/disable I/O functions, these settings are nonvolatile and are restored on power up. Because the power button is disabled, the Model 725 must be disconnected from AC power to turn it off, if the front panel is locked.

## Time base settings

~~Each of the channels of the Model 725 can be~~  
~~independently set to one of four time bases~~

so you can control and measure events which occur a few nanoseconds apart, or a few hundred seconds apart.

In **100** MHz time base mode (the default), the Model 725 aligns signals to an internal 100 MHz clock, for timing resolution of 10 ns. Use this “high resolution” mode when the events of your experiment occur in rapid succession (milliseconds or less).

**100/64** MHz time base mode allows the Model 725 to control events that occur over longer time periods (milliseconds to minutes). This is called “low resolution” mode in the following documentation.

In **Ext.** time base mode, the channels use an external clock. The external clock must be TTL-level between 1 and 100 MHz applied to the EXT. CL. input on the back of the Model 725. This function allows the use of common time bases. It also allows multiple Model 725s

CHANNEL PROPERTIES CHi-2,hannel Properties Screen 5cha





Logic

## Logic Assignments

The logic processor assigns the combination of external inputs (in1–in8) and channel outputs (outA–outG) that will trigger each channel. Logic assignments always appear in the following format:

[the channel to be triggered] = [the conditions that will trigger it];

External inputs ) and channel outputn(puto)-1( t)4(h)-1(e l)4(ogi)4(c processors;nel)therefore,hey appear only on the right side of assignmentput. Logic processor 4( out)4(put)4feed the timingand channelInputs inA–inH;nel these terms appear only on the left side of assignmentput.





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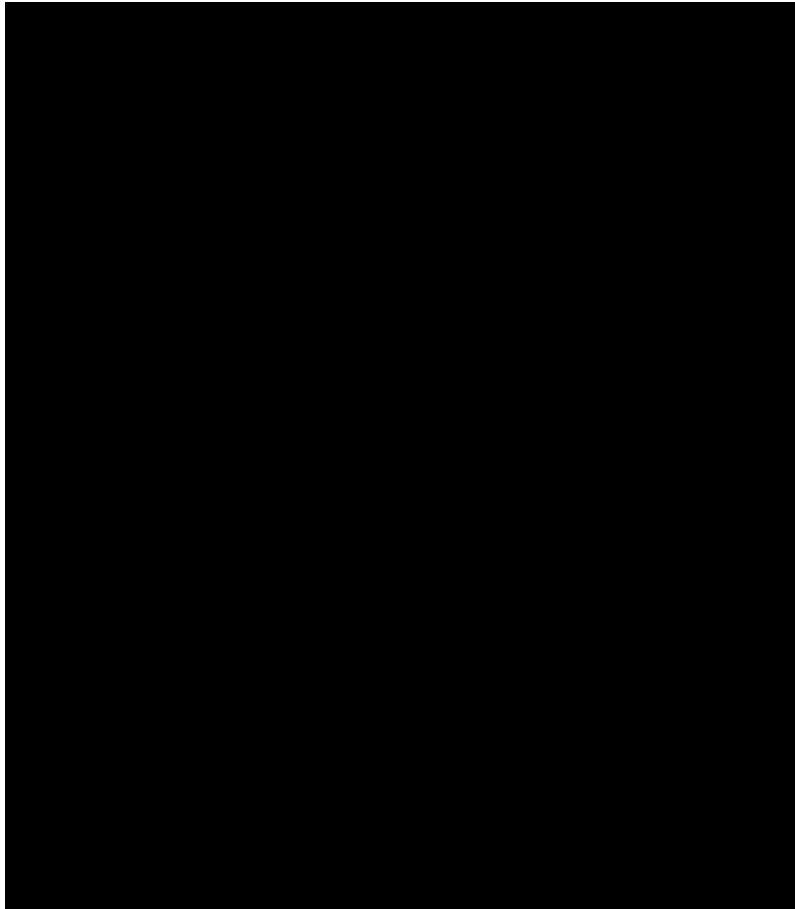






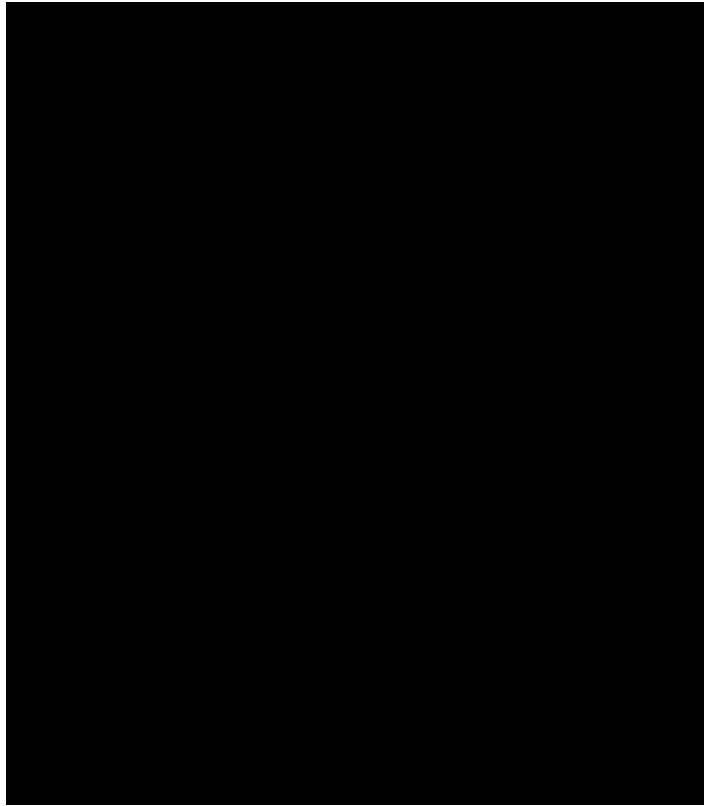
Then click **OK**. With this logic, Channel A will trigger when you depress the external trigger button (connected via BNC cable).

## Fixed Output Mode



In this mode, the channel output is fixed to a specific value (e.g., Low or High) regardless of the input signal.

Passive Mode (Output = Input)







## Delayed Pulse After Trigger Mode

Upon receiving an input signal, a





reaching the limit, press the



A properties screen—the channel LED glows green and you can once again trigger the channel.

10.

## Important Delay Timing Considerations













6. On Channel A's Logic tab, Tc 04 n5 r: inA = ouc 04B and ouc 04C; (You'll learn more about 04 channel







5.







<b>Desired delay</b>	The delay between the trigger and response signals that <b>timerPRO</b> will attempt to maintain.
<b>Duration of pulse</b>	The duration of the output signal
<b>Inverted Output</b>	

Channel C: Dynamic Delay Compensation: Delay: 2.000 ms; Duration: 10.000  $\mu$ s

Averaging: None (1 trigger)

Trigger Input Logic: inC = outA | out B;

Connect a cable from Channel A to one oscilloscope input and a cable from Channel B to another oscilloscope input. If you have more channels, you can also connect Channel C to the oscilloscope.

The delay between channel A (Trigger) and B (Indicator) will be exactly 2 ms, even though you never specified to Channel C the delay required to trigger Channel B at the right time. The mode

Channel B, which will provide a precision “delayed indicator” pulse. The delay of Channel B will be added to the “Desired Delay” of Channel C.

On the oscilloscope you will see that the delay between pulses on Channels A and D always settle





When a channel is in Fixed Output, Clock Pulse, Output=Input or Toggled timing modes, the green light indicates that the output is currently LOW for that channel.

2. A red light typically indicates that the channel is in the process of triggering.

When a channel is in Fixed Output, Clock Pulse, Output=Input or Toggled timing modes, the red light indicates that the output is currently HIGH for that channel.

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***NOTE:***











External Clock

The “Ext Clk” input on the back of the Model 725 allows the time base to be controlled by an external source.

Firmware

The internal code of the Model 725 controller. The firmware, as well as the **timerPRO** software, can be field-upgraded. Latest upgrades are available at [www.berkeleynucleonics.com](http://www.berkeleynucleonics.com).

Predefines

Trigger	An input signal that initiates a channel function.
<b>timerPRO</b> (software)	The control software for the Model 725.
Trigger Validation Mode	Also known as “Noise Suppression” mode. This timing mode

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