Dual Timer

LED, Multi Function, Digital

LB4065-101 Timer – 220/240V.AC. 50/60Hz

Description:

This multi function Dual Timer is designed for use with 2x Air Track Photo Gates operating simultaneously and the IEC Free Fall instruments that use a solenoid release system. It is high speed with resolution to 0.0001s and has two counting modes. The rear panel has sockets for powering photogates and a power source and special socket for the Free Fall solenoid release at the instant that timing begins.

Special Features Are:

- Convenient sloping front panel
- Large six digit LED display. Press button operation, LED indication of functions.
- Automatic loading memory up to a depth of 20 values.
- Memory items can be selectively deleted to remove errors. Memory items can be scrolled, erased, totalled or averaged.
- Output sockets for 2V, 6V and 12V.AC. supply for photogate lamps or LEDs.
- Power socket for solenoid to release ball for Free Fall experiment.
- Remote RESET socket behaves the same as the RESET press button.
- High speed timing to 100 microseconds resolution.
- All timing operations are crystal locked ensuring an accuracy of better than: 0.01% +/-1 least significant digit. All functions are microprocessor controlled

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Width: 170mm	Length: 140mm	Height: 110	Weight: 1.3kg

General:

Initial Power On:

Timer is fitted with IEC mains socket to accept separate mains cable. Plugs into a standard 220/240V.AC. power outlet. When switched ON, digital display should illuminate.

Timing & Resolution:

up to 99.9999 seconds at 0.0001s (0.1 mS) resolution then AutoRange to 999.999 seconds at 0.001s (1 mS) resolution.

Automode:

This excellent automatic IEC feature can save classroom time and avoid connection difficulties and confusions. You do not need to know whether external connections are normally open or normally closed. Just connect the cables to the external devices, press STOP then RESET and the timer is
ready to perform when there is a change in state of the external circuits. If the external circuit is joined, breaking connection will start timing and if the external circuit is open circuit, joining will start timing. The same applies to the STOP circuits.

Button Function:

Mode:

Selects either of 2 modes of operation.

1) **START / STOP**
   means that a momentary pulse on input 1 will start the timer and it will continue timing until a momentary pulse on input 2 stops it. Called 'latched' inputs.

2) **PHOTOGATE**
   mode means that while a signal is applied to input 1 the timer is running but when the signal is removed from input 1 the timer stops. The same situation exists for input 2, thus 2 Photo Gates can be run at the same time with their times kept separate and this is why the timer is called a Dual Timer.

Gate View:

Timing occurs on both inputs simultaneously, but the button selects which INPUT time is being displayed.
The INPUT 1 and 2 displayed values can be swapped at any time and an LED on the panel indicates clearly which reading is selected.

NOTE: If each Photo Gate is passed through once only, the readings displayed are the readings of that pass. If a collision experiment is being performed, each Photo Gate will be passed through twice. The displayed value is then the time of the second pass. To recall the previous time for the first pass, press the MEM DOWN button.

On Rear Panel:

Lamp or Led Output:

4mm banana sockets provide Common and 2V, 6V and 12V.AC. at 0.5 amp for Photogate lamps, LEDs etc..

Solenoid Release for Free Fall Experiments:

An 'RCA' socket provides a constant current power source to the solenoid on a 'Free Fall' apparatus to hold ball in place. When timing is initiated, this power is instantly removed from the solenoid to allow the ball to fall. Provides approx. 150mA constant current into a 15 ohm solenoid coil.

Manual Control Press Button Operations:

Start / Hold:
initiates timing. During timing and while depressed, halts the display to check values. Timing continues in the background.

Stop:
stops timing and the value is automatically stored in memory.

Reset:
If timing has stopped, pressing will zero the display. If pressed after pressing STOP, it performs 'AutoMode' external connection check on the status of the INPUT 1 & 2 sockets (see explanation of 'automode' above).

Mem Up / Mem Dn:
scrolls and recalls up to 20 active memory locations for either INPUT 1 or INPUT 2.
MEM UP = recent times MEM DOWN = previous times.

Remote:
this socket duplicates the RESET and Memory Clear button function. Using a long cable, this socket can be joined to the common or 'GRND' socket by a switch or press button to create a REMOTE RESET control. As with the Reset button, this socket will clear the memory locations if joined to 'GRND' until two beeps are heard.

Memory Functions:

STORING:
When STOP occurs, the last value is automatically stored into memory. When any value is stored, the small memory LED illuminates. When the first 20 values are stored (memory full), the memory LED flashes and subsequent readings are not stored. The timer can be used normally even if the memory is full.

MEM UP / DOWN:
When not timing, buttons scroll through the active memory store. When the first or last stored memory is reached, a longer beep sounds. UP = Recent DOWN = Previous times.

TOTAL:
Adds all the memory values together. Press and hold until double beep is heard. Total of memory values will display whilst button is held depressed.

AVRG:
Calculates the average of all the memory values. Press and hold until double beep is heard. Average will display whilst button is held depressed.

PURGE:
Removes selected memory values. Scroll to select the unwanted value (UP = Recent and DOWN = Previous). Hold down button until double beep is heard. Selection is now erased from memory leaving the other values untouched. Display shows '------'.

CLEAR:
Empties ALL memory values of BOTH inputs 1 & 2. Press and hold button until double beep is heard. Memory store will be empty and the small memory LED will be off.

More Operational Information:

Start / Stop Mode:

When INPUT 1 green socket connection changes status momentarily, the timer runs. Timing is latched and these sockets then have no effect. When the status of the INPUT 2 red socket connection changes momentarily, timing unlatches and the timer stops. The time value is displayed and is also stored into memory.

WHEN TO USE: see Fig 1

If a glider has a flag attached and one Photo Gate is to start the timing and a second gate some distance away must stop the timing, one gate would be connected to input 1, the other gate connected to input 2, press STOP then RESET. Then allow glider to travel through the gates. The leading edge of the flag starts and stops the timing.

Always execute “Automode” before starting experiments.

Photogate Mode – Single Pass:

In this mode, As the glider flag enters the gate the timer starts and as it leaves, the timing stops. The length of the flag is important to calculate the velocity of the glider. If there are 2 Photo Gates, both can be connected to input 1 as shown in the examples. The second time will be displaying and the first time will be in memory of the timer and must be recalled.

When to use see Fig 2

Alternatively, each gate can be connected to a different input. When the glider flag passes through both gates, the gate selected by the GATE VIEW button will display and the other will show only when it is selected. Notice the LEDs on the panel always indicating which input is being displayed at any time when in Photogate mode.

There is no example of this in this manual.

Always execute “Automode” before starting experiments.

Photogate Mode – Double Pass:

If 2 gliders are passing through gates, colliding and then passing back through gates after a collision.

Connect each of 2 gates to separate inputs. When the glider flags pass forward through the gates, the times will display. As the gliders collide and rebound back through the gates, the second time will display. The first time in each case is now in the memory of each input number.

Always execute “Automode” before starting experiments.

WHEN TO USE see FIG 3.

When the glider flag passes through both gates, then passes back through both gates, the display will be showing the second time of the selected input. The gate selected by the GATE VIEW button will be displaying. Notice the LEDs on the panel always indicating which input is being displayed at any time when in Photogate mode.

The value displayed is the second or rebound time and the forward time through each gate can be obtained by pressing MEM DOWN. For the other gate, select it with the GATE VIEW button then press MEM DOWN.

Helpful Hints:

1) Always execute 'Automode' (press STOP then RESET) before starting an experiment to zero the display and to automatically set the status of the 2 inputs.
2) When requiring 2 times for each photogate, clear both memories by pressing the RESET/clear button and hold until 2 beeps before running the experiment. If this is done, there will be only the 2 values in memory and the selection of the required value from the 20 level memory store should not be confusing.
3) If the gliders are moving slowly, very often it is possible to read the first (forward) times and write them down before the second (rebound) times can record and display. If this can be done, it saves time because there is no need to recall the first time from input 1 and 2 memories.
4) Always notice the LEDs indicating which input or photogate value or memory is being displayed at any time. To swap the inputs being displayed, press the GATE VIEW button.

Examples of Connections

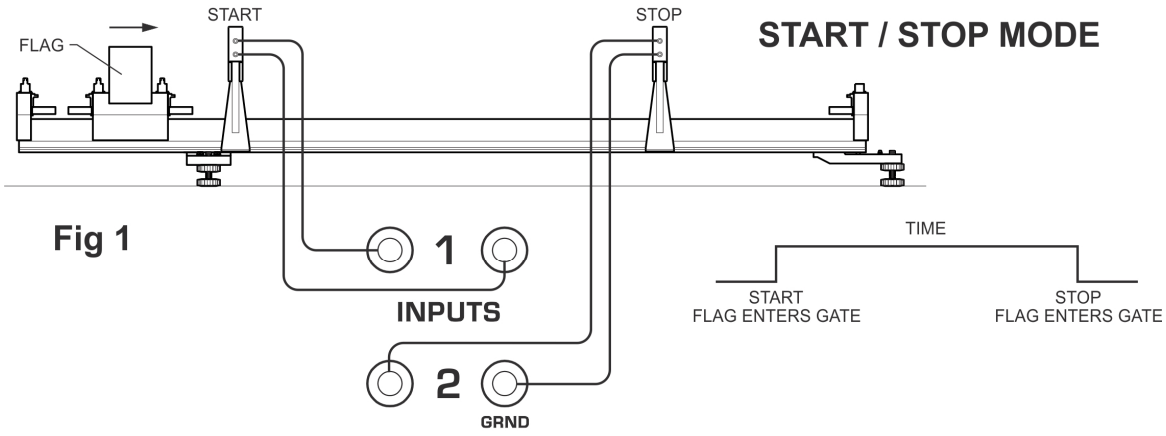

Fig 1

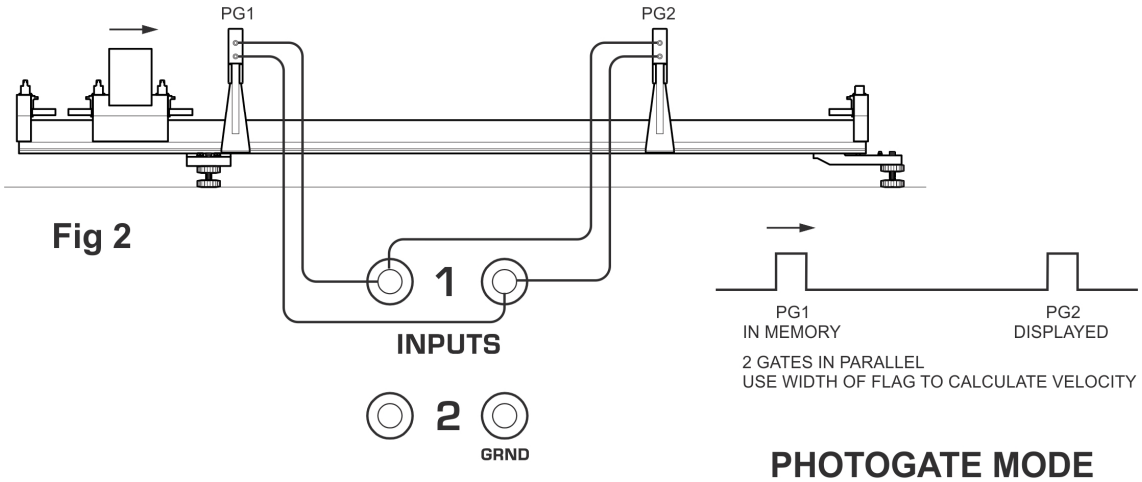

Fig 2

PHOTOGATE MODE

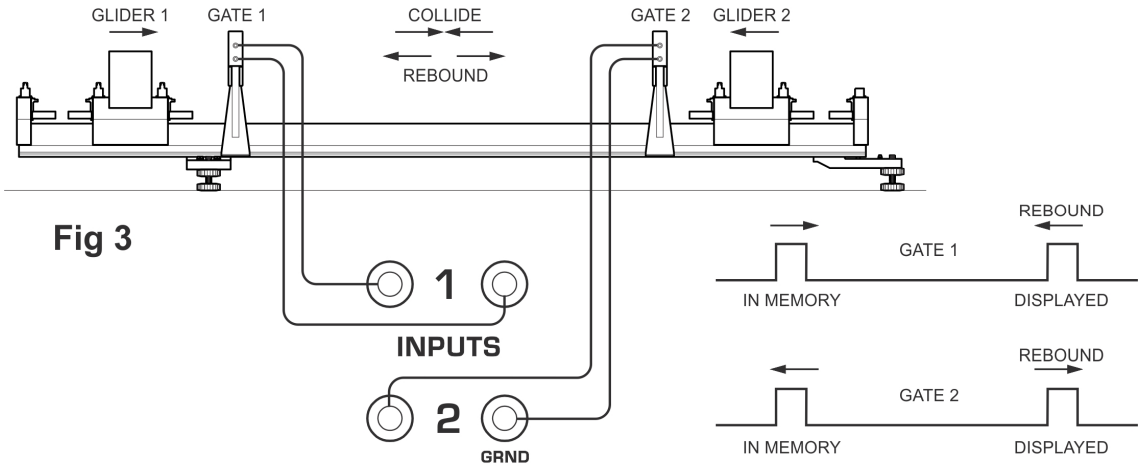

Fig 3

Designed and manufactured in Australia