

# OPERATING INSTRUCTIONS

## Electronic Module System Six-Decade Counter-Timer No. 32382

### 1. Introduction

The Six-Decade Counter-Timer can be used with the 32386 12VAC/DC Amplifier Power Supply for a variety of experiments including frequency counting, radiation counting and timing.

### 2. Description

The six-decade counter-timer has an internal 10kHz crystal, the output of which is divided into 1ms pulses for accuracy. The counter will count pulses at rates to 100kHz. The six-digit display is a seven segment, planar LED type.

### 3. Setup

In all cases the counter-timer is connected to the 32386 Amplifier Power Supply. The reset button of the counter-timer returns the count to zero. It must be pressed when the unit is first turned on, or when a new input is applied. The counter-timer has several other controls or jacks that govern the following functions:

**Interval Timer:** Set the count input switch to 1 kHz for interval timing by one unit every 0.001 sec. The count is continuous with the hold mode switch in the "level" position.

**Frequency Counter:** Use the counter-timer with the 32387 Preset Timer Module; the counter-timer becomes a frequency counter or a radiation half-life scaler at intervals of 1, 10, 100 or 250 seconds.

**Note:** An excessive amount of gain will result in invalid counting because of the noise picked up by the counter. To prevent this effect, set the DC offset at 0 or a little below 0. Apply the pulse source to the amplifier power supply, and set the counter to the "level" position. Then increase the gain, starting at zero, until a continuous count is seen. The counter can then be used in either the "level" or "pulse" position, without having the counting rate affected by the gain.

#### Interrupted Timer:

**Note:** When the counter-timer is used as a timer you will not need to use the gain control, the DC offset or the AC/DC switch.

To time air track experiments, period of a pendulum, free-fall acceleration, etc., refer to the instructions for the 32397 Photocell, the 32395 Light Source, and the 32401 Photogate for connections. Timing is controlled by the hold mode switch, the manual hold switch and the electronic hold jack. A continuous count is available in the "level" position of the hold mode switch. To interrupt the count, depress the manual hold button. Stop and start the count by depressing and releasing the manual hold switch while in the pulse mode.

The electronic hold makes it possible for the counter to accept input from an outside source such as the 32397 Photocell.

If you wish, you can gate the apparatus to control the timing of events. Plug the photocell into the electronic hold and the -6V binding post of the amplifier power supply. The 32395 Light Source is then plugged into the 24-volt jacks on the counter-timer. Now with the timer set in the "pulse" and 1 kHz positions an interruption through the photogate starts the timer. A second interruption stops it.

Use the "level" position to determine the beginning of a timing experiment. When the photogate is interrupted, the timer will signal the exact starting time. You can then switch over to pulse mode to determine the elapsed time.

**Geiger Counter/ Radiation Scaler:** The 450-volt DC output jack is used to connect a lead-in pin from the 32394 Geiger Tube, allowing the six-decade counter-timer to function as a Geiger counter. The counter-timer is powered by the amplifier power supply. Set the count input switch to the power output position.

**Note:** A 100kW series resistor will limit the current temporarily if the supply is shorted.

#### 4. Operation

For detailed information on the use of the six-decade counter-timer in various experiments, refer to the 30195-02 Student Lab Manual for the Cenco Electronic Module System.

#### 5. Maintenance

The Six-Decade Counter-Timer needs no special maintenance. If you should experience any difficulty with a counter-timer, please contact Central Scientific Company, giving details of the problem. To ensure better service, please do not return any apparatus to Central Scientific Company until we have sent you authorization.

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