

# Mr. Pulsar<sup>™</sup>

## *Specialized Function Generator*

### **Getting Started:**

Turn the unit ON with the slide switch on the left side of the unit. The unit will stay on as long as you like, but leaving the unit powered when not in use will run down the 9 volt battery.

After a short menu display showing the version of operating software in the unit, the display will show either “Pulse Mode” or “Frequency Mode” on the display. To switch from one mode to the other press the “Mode” pushbutton on the front panel.

### **Operating in the “Pulse Mode”:**

When in the pulse mode the unit will produce a single pulse at the output terminals each time the “Fire” pushbutton is depressed. The pulse will be a very precise pulse that goes from zero volts to +5 volts for the time period shown on the display and back to zero voltage.

This single pulse will be useful in learning how to capture triggered events on your oscilloscope and test the performance of transient monitoring devices.

To increase the duration of the pulse, press and hold the “Up” pushbutton. To decrease the duration of the pulse, press and hold the “Down” pushbutton. As you continue to hold

the up or down pushbutton you will notice the unit increases the rate of change to help you get to the desired setting more rapidly. As soon as you are near the desired setting release the pushbutton and use shorter depressions on the pushbutton to get to the exact value.

You will notice the frequency display shows the duration in microseconds ( $\mu\text{sec}$ ).

The pulse duration range of the unit is 2  $\mu\text{sec}$  to 9,999  $\mu\text{sec}$  (~10 msec).

I will cover the use of the pulse mode in more detail later.

### **Operating in the “Frequency Mode”:**

When in the frequency mode the unit will produce a continuous square wave at the output terminals regardless of the position of the “Fire” pushbutton. The pulse will be a very precise square wave that oscillates between zero volts and +5 volts at the frequency shown on the display.

This continuous square pulse will be useful in learning how to use your oscilloscope and test the performance of “steady-state” monitoring devices.

To increase the frequency of the square wave, press and hold the “Up” pushbutton. To decrease the frequency of the square wave, press and hold the “Down” pushbutton. As you continue to hold the up or down pushbutton you will notice the unit increases the rate of change to help you get to the desired setting more rapidly. As soon as you are near the desired

setting release the pushbutton and use shorter depressions on the pushbutton to get to the exact value.

We will cover the use of the frequency mode in more detail later.

You will notice the frequency display shows the frequency in kilohertz (kHz).

The frequency range of the unit is 45 Hertz (0.045 kHz) to 60,000 Hertz (60.000 kHz).

### **Some basic tips:**

The unit is powered by a 9 volt alkaline battery. The battery can be replaced by removing the plastic cover on the rear of the unit. Always keep a spare battery and remember to turn the unit off when not in use. If the battery becomes weak a lower voltage magnitude pulse or square wave will be produced before the unit fails to operate.

Under normal operation the peak to peak output of the pulse or square wave will be regulated.

That's about it. If the unit fails to operate please return it to Phasor Labs for repair.

There are no calibration requirements. If operating, the unit can be considered "calibrated".

Operating with the output of the unit into a direct short will only affect the battery life.

Impressing a voltage "into" the unit's output terminal may cause damage.

The output of the unit does have limitations. If you are connecting the output of the unit to a low resistance load, the peak to peak magnitude of the output may lower. This can be expected when using the unit to inject a pulse or square wave into an animal contact point.

Connection of several measuring instruments to the unit at the same time should not have a significant effect.

## When to use Mr. Pulsar

Don't leave the farm until you know your recording setup works correctly. Once you are set up, test each animal contact channel before you leave. Pre-test recordings made with Mr. Pulsar and your instruments will prove the validity of steady state voltage recordings and prove your ability to record impulses.

Setting up digital scopes to capture impulses can be troublesome. Use Mr. Pulsar to generate test impulses, one at time, to verify you have your instrumentation set correctly.

When using Waveform Manager, FlukeView, WaveStar, and similar software to log impulses, use Mr. Pulsar to verify the system is recording properly before you leave the site.

Test your Metrosonics, WaveRider, Ramcorder and Rustrack Ranger stray voltage disturbance recorders with Mr. Pulsar to determine if your disturbance monitor is working correctly.

## Is your True RMS meter accurate?

The square wave output of Mr. Pulsar can be used to check the True RMS performance of your meter.



## Check harmonic analyzers:

Use the square wave voltage from Mr. Pulsar to test your ability to accurately measure harmonic waveforms. The output of Mr. Pulsar will provide a perfect check of your harmonic analyzer or harmonic analysis software.

## Is your Oscilloscope or DVM accurate?

Although Mr. Pulsar is not a certified calibration unit, the high accuracy of the unit can be used to verify that your oscilloscope or voltmeter is reasonable with respect to voltage, impulse magnitude, frequency and sweep time.

### **How are your test leads affecting your measurements?**

Use Mr. Pulsar to generate a precise impulse at the remote connection and compare this recording to an impulse applied directly to the recording instrument. See exactly what effect YOUR test leads have on the recorded waveform.

### **Having problems operating your oscilloscope and data logging equipment?**

Several guides have been prepared to take you step-by-step through the operation of your test equipment. More will follow.

### **How to get more information on Mr. Pulsar?**

Contact Chuck Forster at 608-835-9605 or [cforster@phasorlabs.com](mailto:cforster@phasorlabs.com). Check our website at [www.phasorlabs.com](http://www.phasorlabs.com).

### **Specifications:**

Output pulse: (Single pulse, non-reoccurring)  
0 to +5 volts dc magnitude.  
2 to 9,999 microsecond pulse width.  
Pulse output controlled by pushbutton.

Squarewave Output:  
0 to +5 volts dc magnitude.  
45 Hz to 60 kHz range.  
Fixed voltage output.

Output load resistance:  
Short circuit protected.  
Fixed voltage output.

Power Supply:  
Single 9 volt alkaline battery.

## Getting familiar with the Mr. Pulsar test unit.

Mr. Pulsar is a specialized signal generator designed to produce precise impulses, one at a time, and provide a wide range of continuous square wave output voltages.

The unit is designed to assist in learning the operation of digital oscilloscopes and stray voltage monitoring equipment. The usefulness of the instrument is not limited to these areas, but that was the original purpose for developing Mr. Pulsar.

Things you can do with our test unit include the following:

1. Learn the basic operation of an oscilloscope.
2. Practice capturing random electrical events with a triggered scope.
3. Identify the performance limits of your oscilloscope, stray voltage recorder or power quality disturbance monitor.
4. Check the performance and calibrate your entire test setup before beginning stray voltage measurements.

First remove the unit from the case and locate the on-off switch on the left side of the unit. Move the switch forward to turn the unit on and the LCD display should read:

PULSAR V1.xx  
Phasor Labs

The version of the microprocessor software is displayed for a brief time and then the display will show either:

Pulse Mode  
W=xxxx Microseconds

or

Frequency Mode

$$F=x.xxx \text{ kHz}$$

Press the MODE pushbutton until the Pulse Mode is displayed. In the pulse mode the width or "duration" of the impulse is displayed in microseconds. The range of the test unit is 2 microseconds to 9,999 microseconds or approximately 10 milliseconds.

Conversion factors are listed below for your convenience:

$$2 \text{ microseconds} = 2,000 \text{ nanoseconds}$$

$$2 \text{ microseconds} = 0.002 \text{ milliseconds}$$

$$200 \text{ microseconds} = 0.2 \text{ milliseconds}$$

$$200 \text{ microseconds} = 0.0002 \text{ seconds}$$

$$2,000 \text{ microseconds} = 2 \text{ milliseconds}$$

$$2,000 \text{ microseconds} = 0.002 \text{ seconds}$$

$$9,999 \text{ microseconds} = 9.999 \text{ milliseconds}$$

$$9,999 \text{ microseconds} = 0.009999 \text{ seconds}$$

$$10,000 \text{ microseconds} = 10 \text{ milliseconds}$$

$$10,000 \text{ microseconds} = 0.01 \text{ seconds}$$

Press the UP and DOWN pushbuttons to run the display from 2 to 9,999 microseconds and back. This is how you preset the width or duration of the impulse. No output from the test unit will occur until you press the FIRE button.

Now press the MODE button and the LCD display will show the Frequency Mode display. The frequency displayed is in kilohertz.

Press the UP and DOWN pushbuttons to run the display from 0.045 to 60 kHz and back. This is how you set or vary the frequency of the square wave output. The test unit will continuously output a square wave in the Frequency Mode. The FIRE button has no effect in the Frequency Mode.

Conversion factors are listed below for your convenience:

Frequency (kHz)	Frequency (Hertz)	Time for one (1) cycle (milliseconds)
0.045	45	22.22
0.060	60	16.67 (first harmonic)
0.180	180	5.555 (3 <sup>rd</sup> harmonic)
0.300	300	3.333 (5 <sup>th</sup> harmonic)
0.420	420	2.381 (7 <sup>th</sup> harmonic)
0.540	540	1.852 (9 <sup>th</sup> harmonic)
0.660	660	1.515 (11 <sup>th</sup> harmonic)
0.780	780	1.282 (13 <sup>th</sup> harmonic)
1.000	1,000	1.000
10.000	10,000	0.100
20.000	20,000	0.050
40.000	40,000	0.025
60.000	60,000	0.0167

The magnitude of the impulse and the square wave is 5.0 volts (+/-) without a load on the test unit. This is a peak to peak voltage for the square wave and a peak voltage for the impulse. The output of the test unit is either 0 volts or +5 volts. The square wave does not center about the zero axis. The same is true for the impulse output.

The unit is designed to operate into a short circuit indefinitely, however the battery life will be shortened. For normal operation into a recording device or injection into a cow contact test point, the output of Mr. Pulsar will be approximately as shown below:

Impedance of Circuit	Output (Peak to Peak)	Output (True RMS)
Digital Volt Meter	5.2 volts	2.5 volts
Oscilloscope	5.2 volts	2.5 volts
Meter w/500 resistor	4.4 volts	2.1 volts
Cow Contact at 500	4.4 volts	2.1 volts
Cow Contact at 100	2.5 volts	1.2 volts

Perform a source resistance test on the Mr. Pulsar, it should be about 103 ohms.

There are no user serviceable components in the unit, however if the LCD display ever becomes dim or too dark, an internal potentiometer can be adjusted for the desired display contrast.

Power requirements are provided by a standard 9 volt alkaline battery, replaceable on the rear of the unit. The unit does not have an automatic shutoff, so when not using the unit for a period of time be sure to shut down the unit.

The operation of Mr. Pulsar is controlled by an internal microprocessor unit. If required, periodic system upgrades will be provided at a very nominal charge. Be sure to send in your registration information so we can notify you of any upgrades.