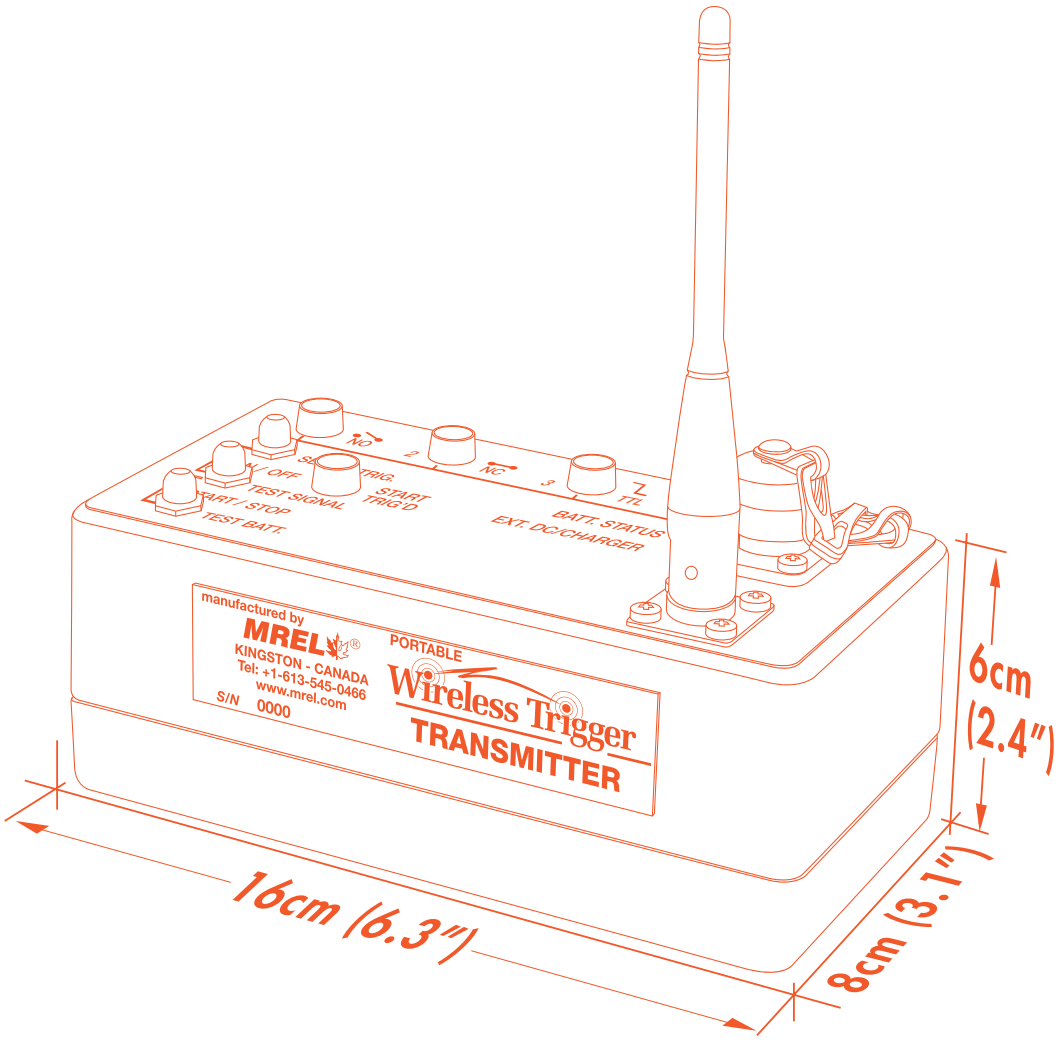
PWT™ PORTABLE WIRELESS TRIGGER

Operations Manual

Edition 3.1



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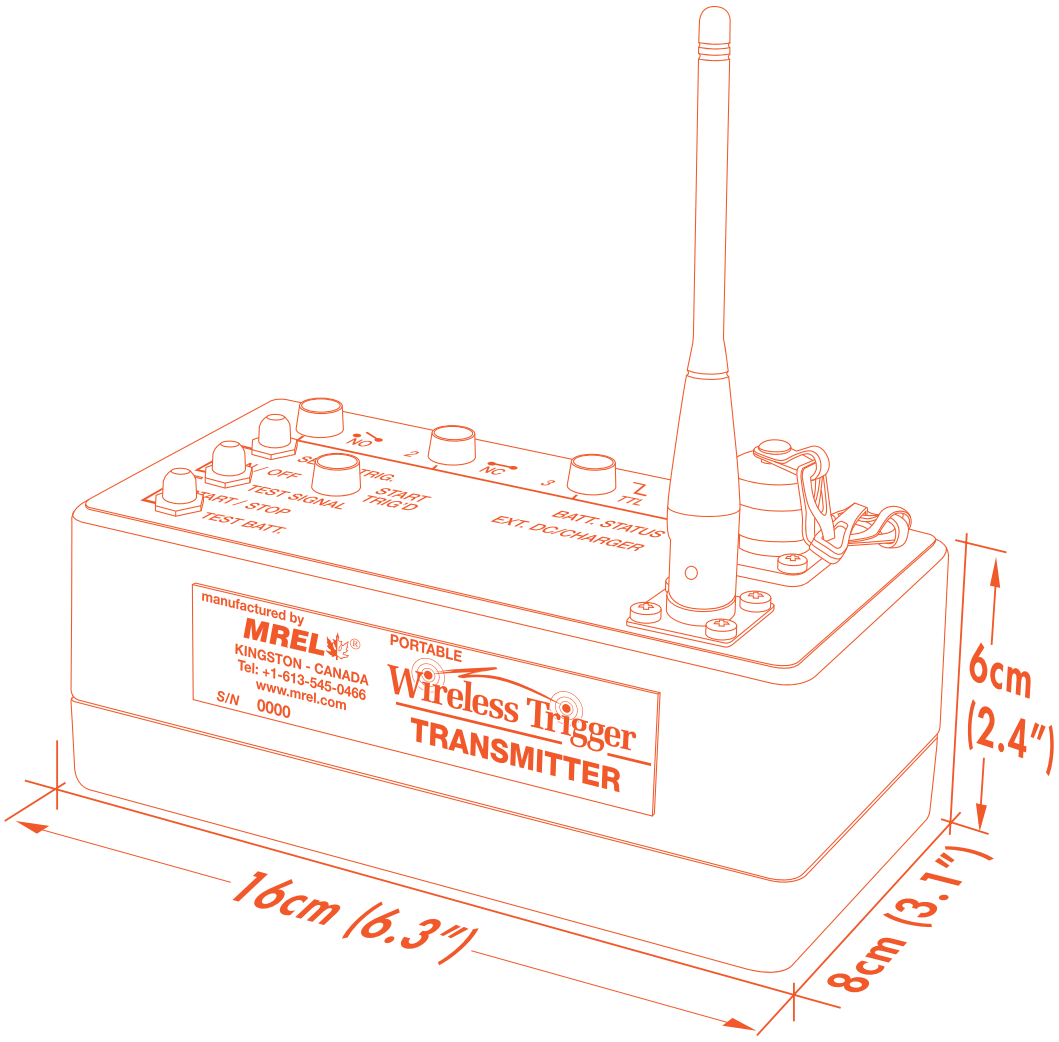


Overview

This Chapter describes all of the hardware components provided with the Portable Wireless Trigger™ System.

1.1 Hardware Components

1. **Portable Wireless Trigger™ Transmitter** Unit.
2. **Portable Wireless Trigger™ Transmitter Charger** that is labelled 120 VAC or 230 VAC depending on your Country's mains power.
3. **12 VDC Power Adapter** for operating **Portable Wireless Trigger™ Transmitter** from an external 6 to 12 VDC.
4. **Push Button Trigger Switch**.
5. **Portable Wireless Trigger™ Receiver** Unit.
6. **Portable Wireless Trigger™ Receiver Charger** that is labelled 120 VAC or 230 VAC depending on your Country's mains power.
7. **12 VDC Power Adapter** for operating **Portable Wireless Trigger™ Receiver** from an external 6 to 12 VDC.
8. **Padded Carry Case**.
9. 2 **Tripods**
10. 2 **Grip ball heads**
11. **Portable Wireless Trigger™** Operations Guide.
12. (Optional) **Coaxial Cable** on cable reel.

1.1.1 Portable Wireless Trigger™ Transmitter And Receiver

The **Portable Wireless Trigger™ Transmitter** and **Receiver** look identical except for the label indicating either **Transmitter** or **Receiver**. Both contain electronic circuitry and an internal rechargeable battery within a protective metal case.

The protective case prevents damage from water, sand, snow, dust and similar harsh weather conditions. As well, the case offers resistance to high temperatures, shocks and vibrations.

The **Portable Wireless Trigger™ Transmitter** and **Receiver** both have standard tripod mounts on the bottom of the unit.

The Serial Number of the **Portable Wireless Trigger™ Transmitter** begins with a series of numbers and the last number is number zero. **Portable Wireless Trigger™ Receivers** that are matched to the **Portable Wireless Trigger™ Transmitter** begin with the same series of numbers and the last number is either: 1, 2, 3, or 4. Four **Portable Wireless Trigger™ Receivers** can be electronically matched to one **Transmitter**. Instructions for the field operation of the **Portable Wireless Trigger™ Transmitter** and **Receiver** are provided in **Section 3.1**.

1.1.2 Tripod and Grip ball Head

This is an all aluminum **Tripod** with a 3/8" mounting screw. This **Tripod** is designed to support the **Grip Action Ball Head** with the **Portable Wireless Trigger™** attached. This is the only item that does not fit inside the **Protective Carry Case**. You will receive 2 Tripods, one for the **Portable Wireless Trigger™ Transmitter and one for the Portable Wireless Trigger™ Reciever**

1.1.3 Battery Charger

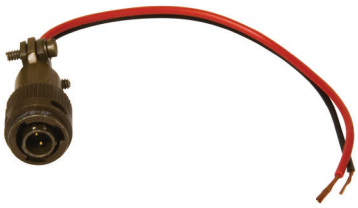
The **Battery Chargers** have a specification printed on them, either 120 VAC or 230 VAC. They are used to charge the **Portable Wireless Trigger™ Transmitter** and **Receiver** internal rechargeable batteries.

STOP

Contact **MREL** if the **Battery Charger** that has been supplied is incorrect for the mains voltage in your country.

1.1.4 12 VDC Power Adapter

The **12 VDC Power Adapters** are provided to allow powering of the **Portable Wireless Trigger™ Transmitter** and **Receiver** from external 6 VDC to 12 VDC power.



1.1.5 Push Button Trigger Switch

The **Push Button Trigger Switch** is provided to facilitate easy command triggering of the **Portable Wireless Trigger™ Transmitter** by the Operator. It is a normally open (NO) switch which closes when pressed.

1.1.6 BNC to BNC Wire

1.1.7 Carry Case

The **Carrying Case** holds the **Portable Wireless Trigger™ Transmitter** and **Receiver**, **Battery Charger**, **12 VDC Power Adapter, Push Button Trigger Switch** and the **BNC to BNC Connector**.

1.1.8 RG-58/U Coaxial Cable And Portable Cable Reel (Optional)

As an optional accessory, **MREL** offers a portable cable reel with 333 ft. (101 m) of RG-58/U coaxial cable to use as a trigger signal relay cable between the trigger event and the **Portable Wireless Trigger™ Transmitter** and/or from the **Portable Wireless Trigger™ Receiver** to the instrument being triggered.

1.2 Internal Rechargeable Batteries

The **Portable Wireless Trigger™ Transmitter** and **Receiver** both have an assembled battery pack consisting of four internal AA Ni-Cad rechargeable batteries. The **Portable Wireless Trigger™ Transmitter** and **Receiver** are both supplied with an approved 120 VAC or approved 230 VAC **Battery Charger**, depending on the country of use.

When the internal battery is fully charged, the **Portable Wireless Trigger™ Transmitter** and **Receiver** can operate for 8 hours before battery recharging is required. The **Portable Wireless Trigger™ Transmitter** and **Receiver** are shipped from **MREL** fully charged. Since some time may elapse before the **Portable Wireless Trigger™ Transmitter** and **Receiver** are actually put to use, the **Portable Wireless Trigger™ Transmitter** and **Receiver** may not be charged fully the first time they are used. Full operating time will be obtained when the **Portable Wireless Trigger™ Transmitter** and **Receiver** are recharged.

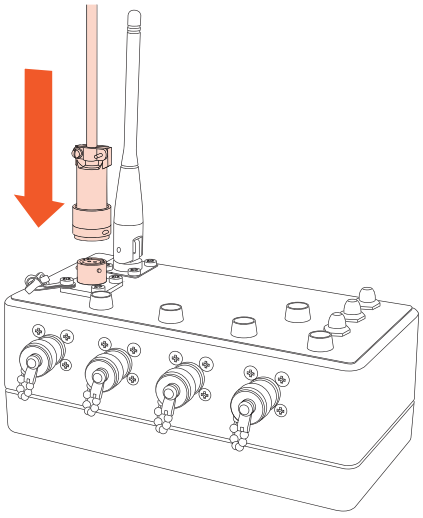
Normal charging time for the batteries is 8 to 10 hours. Leaving the **Portable Wireless Trigger™ Transmitter** and **Receiver** connected to the chargers for longer periods than this can reduce the "charge lifetime" of the batteries (the number of full charges it can take, normally about 300). The **Portable Wireless Trigger™ Transmitter** and **Receiver** are fully operational when connected to AC mains through the **Battery Charger**.

1.3 Recharging The Portable Wireless Trigger™ Transmitter And Receiver

The procedure to recharge the **Portable Wireless Trigger™ Transmitter** and **Receiver** is as follows:

Ensure that the **Battery Charger** is labelled appropriately for the AC voltage mains power available.

1. With the **Portable Wireless Trigger™ Transmitter** and **Receiver** switched **OFF**, connect the **Battery Charger** between the **EXT DC/CHARGER** port on the **Portable Wireless Trigger™ Transmitter** and **Receiver** and the wall outlet.
2. Full recharging is obtained after 8 to 10 hours of charging.
3. Unplug the **Battery Charger** from the wall outlet and then from the **Portable Wireless Trigger™ Transmitter** and **Receiver**.



1.4 Long Term Storage Considerations

CAUTION

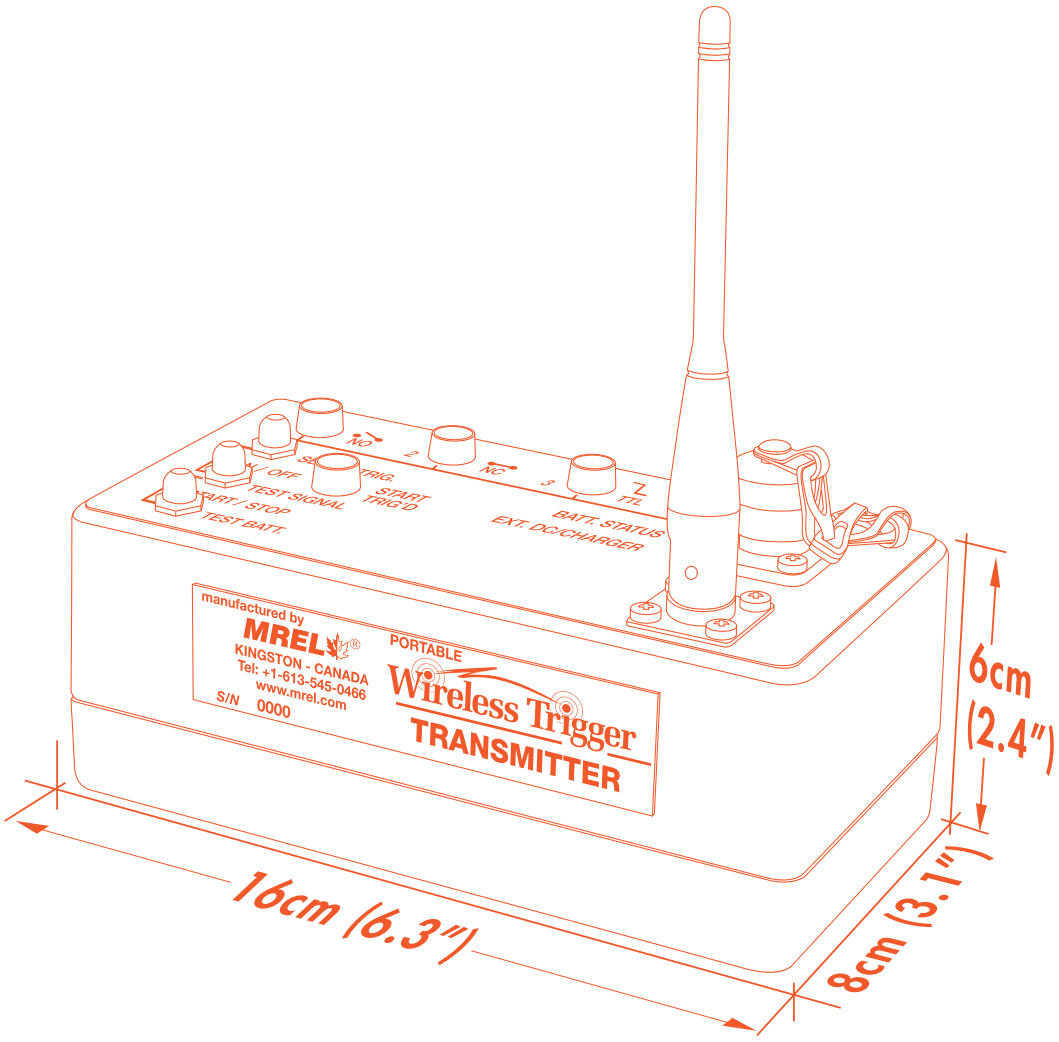
The **Portable Wireless Trigger™** Transmitter and Receiver internal batteries can not be overcharged. According to the battery Manufacturer's specifications, full battery pack recharging will take 8 to 10 hours. Charging for extended periods of time can lower the lifetime of batteries, but not damage the **Portable Wireless Trigger™** Transmitter or Receiver

No special procedures, other than those pertaining to the internal batteries, should be taken for long term storage of the **Portable Wireless Trigger™ Transmitter** and **Receiver**. In the eventuality that the **Portable Wireless Trigger™ Transmitter** and **Receiver** remain idle for long periods, it is recommended to recharge the **Portable Wireless Trigger™ Transmitter** and **Receiver** once per month per the procedure in **Section 2.3**. This will maintain the conditioning of the internal batteries. If the batteries lose their ability to hold a charge, please contact **MREL** or a local Ni-Cad battery pack distributor for a replacement battery pack.

1.5 Operating From External 12 VDC Power

Both the **Portable Wireless Trigger™ Transmitter** and **Receiver** can be connected to external 6 VDC to 12 VDC power thorough the use of the 12 VDC Power Adapters. Connect the 12 VDC Power Adapters to the **EXT DC/CHARGER** port of the **Portable Wireless Trigger™ Transmitter** and **Receiver** and connect the other end of the 12 VDC Power Adapters to 6 VDC to 12 VDC power, red wire to the external + (positive) and black wire to the external - (negative) terminals.

Chapter 2
Getting Started



Overview

This chapter provides an outline of how to setup the Portable Wireless Trigger™ Transmitter and Receiver. Testing of the Transmitter and Receiver should be done in an office setting before use in the field.

2.1 Introduction

This chapter provides a detailed description of the setup procedure for the **Portable Wireless Trigger™**. The **Quick Setup Guide** is also included in **Chapter 3.3**. For Instruction on using the **Portable Wireless Trigger™** in the field, please refer to Chapter 5. All of the steps to setup the **Portable Wireless Trigger™ Transmitter** and **Receiver** should be completed in an office environment before the operator goes into the field.

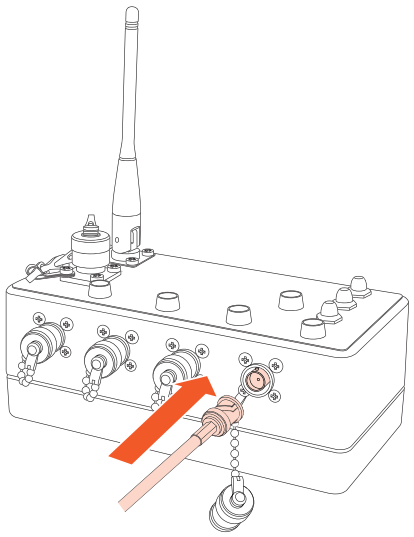
2.2 Setting Up the Equipment

The equipment required for the setup of the **Portable Wireless Trigger™** in an office environment is: **Portable Wireless Trigger™ Transmitter, Portable Wireless Trigger™ Receiver, 2 Tripods, 2 Grip Action Ball Heads,** and **Push Button Trigger Switch.**

Ensure that both the **Portable Wireless Trigger™ Transmitter** and **Receiver** have been fully recharged before beginning.

2.2.1 Portable Wireless Trigger™ Transmitter Setup

Open and extend the **Tripod** legs. Attach the **Grip Action Ball Head** to the top of the **Tripod** using the 3/8" screw mount. Remove the **Mounting Adapter** from the top of the **Grip Action Ball Head** and connect the threaded screw of the **Mounting Adapter** to the bottom of the **Portable Wireless Trigger™**. Attach the **Mounting Adapter** to the **Grip Action Ball Head**. Secure the **Portable Wireless Trigger™** using the locking lever located on the **Grip Action Ball Head**. It is also good practice to utilize the locking lever pin ensure the locking lever does not come free during operation.



Connect the **Push Button Trigger** into the **BNC Connector** on the **Portable Wireless Trigger™ Transmitter** as shown in the image to the left. Extend the **Aerial** on the unit so that it is pointing upwards, as shown in the image to the left.

Turn on the **Portable Wireless Trigger™ Transmitter** by pressing the **SELECT TRIG.** and **TEST SIGNAL** buttons together. Then press the **SELECT TRIG.** button until the **LED** at position 1 has lit up. This **Trigger** selection for the **Push Button Trigger** is the **Normally Open (NO) Trigger**.

2.2.2 Portable Wireless Trigger™ Receiver Setup

With the second **Tripod**, open and extend the legs. Attach the **Grip Action Ball Head** to the top of the **Tripod** using the 3/8"screw mount. Remove the **Mounting Adapter** from the top of the **Grip Action Ball Head** and connect the threaded screw of the **Mounting Adapter** to the bottom of the **Portable Wireless Trigger™**. Attach the **Mounting Adapter** to the **Grip Action Ball Head**. Secure the **Portable Wireless Trigger™** using the locking lever located on the **Grip Action Ball Head**. It is also good practice to utilize the locking lever pin ensure the locking lever does not come free during operation.

Turn on the **Portable Wireless Trigger™ Receiver** by pressing the **SELECT TRIG.** and **TEST SIGNAL** buttons together.

2.2.3 Testing the signal

On the **Portable Wireless Trigger™ Receiver,** press the **TEST SIGNAL** button. An **LED** will light on the **Portable Wireless Trigger™ Receiver** corresponding to the address of the **Portable Wireless Trigger™ Receiver.** Next press the **TEST SIGNAL** button on the **Portable Wireless Trigger™ Transmitter**, if the test signal worked between the **Portable Wireless Trigger™ Transmitter** and the **Portable Wireless Trigger™ Receiver**, the same **LED** will light up on the **Portable Wireless Trigger™ Transmitter**. For example, if the **Portable Wireless Trigger™ Receiver** has an address of 3, then the **Portable Wireless Trigger™ Transmitter's LED** 3 will light.

2.2.4 Testing a Trigger Event

Now that the signal between the **Portable Wireless Trigger™ Transmitter** and **Portable Wireless Trigger™ Receiver** has been tested and confirmed, we can now test a **Trigger** event. Make sure that on the **Portable Wireless Trigger™ Transmitter** that the **Normally Closed (NC) Trigger** has been selected (as done at the end of **Section 2.2.1**). Now press on both the **Portable Wireless Trigger™ Transmitter** and the **Portable Wireless Trigger™ Transmitter** the **TEST SIGNAL** and **TEST BATT.** buttons to start waiting for a **Trigger** on both the **Transimtter** and the **Receiver**. The **START LED** will illuminate on both the **Transimtter** and the **Receiver**. Take the **Push Button Trigger** which is attached to the **Portable Wireless Trigger™ Transmitter**, and depress the button which will **Trigger** an event. On both the **Portable Wireless Trigger™ Transmitter** and the **Portable Wireless Trigger™ Receiver** the START LED should begin flashing indicating that both were Triggered.

This concludes the testing of the **Portable Wireless Trigger™ Transmitter** and the **Portable Wireless Trigger™ Receiver** and now both are ready for use in the field.

2.3 Applications Of The Portable Wireless Triggers™

Problem: Many recording applications require the instrumentation to begin recording upon receiving a trigger command either from the operator or from the event being recorded. It is often very labour intensive and quite impractical to run one or more trigger signal cables over long distances and difficult terrain.

Solution: Portable wireless transmitter and receivers that consist of a transmitter located either near the event or near the operator, that when triggered emits a low power, wireless trigger signal which is received by one or more receivers connected to the standard trigger inputs of the instrumentation.

Automated Triggering	Typically the **Portable Wireless Trigger™ Transmitter** is located close to the event. A short trigger line or a TTL signal line is connected between the event and the **Portable Wireless Trigger™ Transmitter**. The **Portable Wireless Trigger™ Receiver**(s) are located at a remote location from the event near the instrument(s) and connected to the external trigger inputs of the instrument(s). When the trigger signal is received at the **Portable Wireless Trigger™ Transmitter** it sends a trigger signal to the **Portable Wireless Trigger™ Receiver**(s) that relay the trigger signal to the instrument(s).
Command Triggering	Typically the **Portable Wireless Trigger™ Transmitter** is located close to or with the Operator. A push button trigger switch is attached to the **Portable Wireless Trigger™ Transmitter**. The **Portable Wireless Trigger™ Receiver**(s) are located at a remote location from the Operator near the instrument(s) and connected to the external trigger inputs of the instrument(s). When the Operator pushes the push button trigger switch the **Portable Wireless Trigger™ Transmitter** sends a trigger signal to the **Portable Wireless Trigger™ Receiver**(s) that relay the trigger signal to the instrument(s).

2.4 Accepted Input And Output Signals

The **Portable Wireless Trigger™ Transmitter** and **Receiver** is designed to accept a wide range of input signals into the **Portable Wireless Trigger™ Transmitter** and output a wide range of signals from the **Portable Wireless Trigger™ Receiver**. The input signals that the **Portable Wireless Trigger™ Transmitter** will accept and the output signals that the **Portable Wireless Trigger™ Receiver** will emit are as follows: **Normally Open (NO)**, **Normally Closed (NC)**, **TTL Falling Edge** and **TTL Rising Edge**. The input signal to the **Portable Wireless Trigger™ Transmitter** is not required to be the same as the output signal on the **Portable Wireless Trigger™ Receivers**.

For example, the **Portable Wireless Trigger™ Transmitter** maybe set to accept a **Normally Closed** input signal (the NC **LED** flashing) while each of the possible four **Portable Wireless Trigger™ Receivers** can each be set to one of the four options of **NO**, **NC**, **TTL Falling Edge**, **TTL Rising Edge**. The **Portable Wireless Trigger™ Transmitter** will only accept the appropriate input into the **BNC** connector corresponding to the flashing **LED** and the **Portable Wireless Trigger™ Receiver** will transmit into the **BNC** connector corresponding to the flashing **LED**.

2.4.1 Definition Of Signals

Normally Open (NO)

The **Normally Open** signal is defined as a circuit which has an infinite resistance and will change status when the resistance of the circuit decreases to near zero ohms. This circuit does not require an external power source. The triggered signal will be sent to the **Portable Wireless Trigger™ Receivers** from the **Portable Wireless Trigger™ Transmitter** when the status of the signal changes from high to low resistance.

Normally Closed (NC)

The **Normally Closed** signal is defined as a circuit which has a resistance near zero ohms and will change status when the resistance of circuit increases to near infinity. This circuit does not require an external power source. The triggered signal will be sent to the **Portable Wireless Trigger™ Receivers** from the **Portable Wireless Trigger™ Transmitter** when the status of the signal changes from low to high resistance.

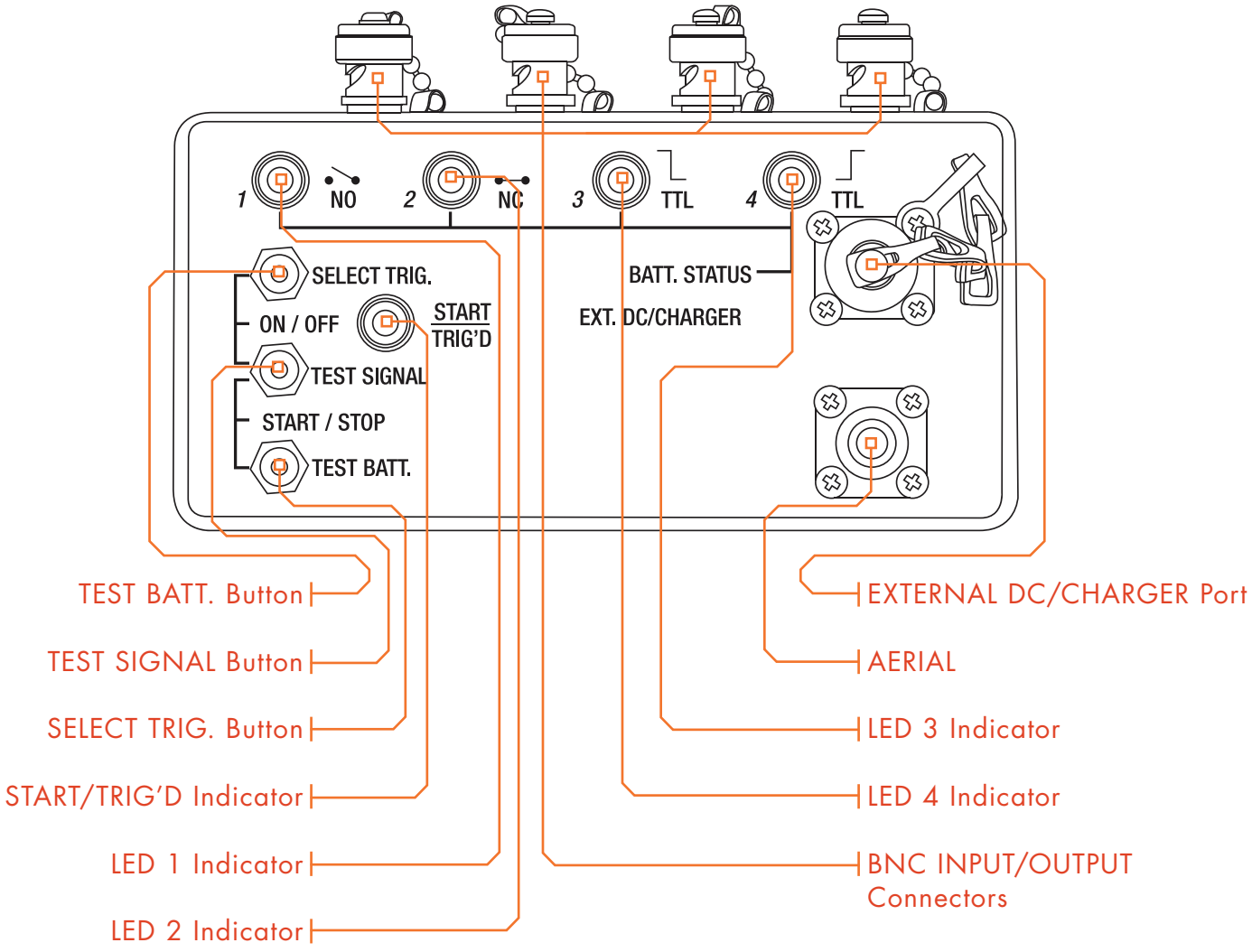
TTL Falling Edge

A **TTL Falling Edge** signal is defined as a circuit which has a voltage of 5 volts and will change status when the voltage drops to below 0.8 volts. This circuit does require an external power source. The triggered signal will be sent to the **Portable Wireless Trigger™ Receivers** from the **Portable Wireless Trigger™ Transmitter** when the status of the signal changes from high to low voltage.

TTL Rising Edge

A **TTL Rising Edge** signal is defined as a circuit which has a voltage of 0 volts and will change status when the voltage rises above 2.2 volts. This circuit does require an external power source. The triggered signal will be sent to the **Portable Wireless Trigger™ Receivers** from the **Portable Wireless Trigger™ Transmitter** when the status of the signal changes from low to high voltage.

2.5 Main Control Panel



TEST BATT. Button:

Press this button to find out the amount of battery charge is available in the unit. **LED 1** to **4** will light up depending on the battery charge percentage. **LED 1** will flash if the unit needs to be recharged. If **LED 1** shows a steady light, the unit is at **25%** battery charge. If **LED 2** show a steady light, the unit is at **50%** charge. If **LED 3** shows a steady light, the unit is at **75%** charge. If **LED 4** shows a steady light, the unit is at **100%** charge. If the unit needs to be charged, please see **Section 2.3** for instructions.

TEST SIGNAL Button:

If this button is pressed on the **Portable Wireless Trigger™ Transmitter**, the number of receivers found will be displayed by illuminating the corresponding **LED**. **LED 1** for one receiver, **LED 2** for 2 receivers, **LED 3** for 3 receivers and **LED 4** for 4 receivers. The maximum amount of receivers that can be used with 1 transmitter is 4.

If this button is pressed on the **Portable Wireless Trigger™ Receiver**, the address for the **Portable Wireless Trigger™ Transmitter** will be displayed.

SELECT TRIG. Button:

This button is pressed on the **Portable Wireless Trigger™ Transmitter** or the **Portable Wireless Trigger™ Receiver** to select the 4 types of **Trigger** available. **LED 1** to **4** will light up corresponding to the Trigger type chosen. Review **Section 2.6.1** for more information. The type of **Trigger** can be set individually for both the **Transmitter** and the **Receiver** and both do not have to be the same.

START/TRIG'D Indicator:

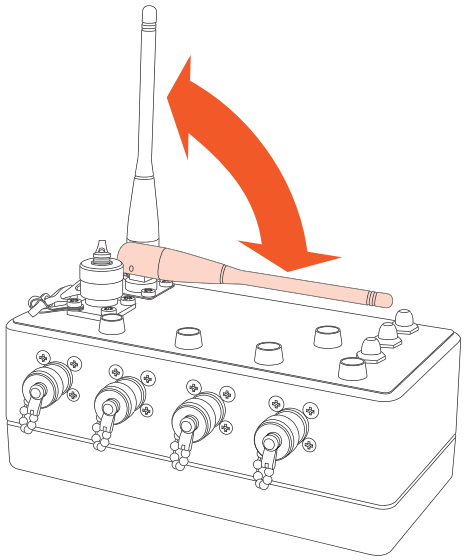
When the **TEST SIGNAL Button** and the **TEST BATT. Button** are pressed together this **LED** will light and not flash. This means that the **Portable Wireless Trigger™ Transmitter** or **Portable Wireless Trigger™ Receiver** is now waiting for a **Trigger**. Once an event has been **Triggered**, this light will begin to flash.

LED 1 to 4 Indicators:

These **LEDs** are used to display various setting on the **Portable Wireless Trigger™ Transmitter/Receiver**. They display the current **Trigger** setting, the amount of Battery charge in the unit as well as the signal strength.

EXTERNAL DC/CHARGER Port:

This port is used to recharge the **Portable Wireless Trigger™ Transmitter/Receiver** as well as provide continuous DC current to the unit. Please see **Section 2.3** for recharging instructions.



AERIAL:

The aerial is used to transmit the **Trigger** information to the other units. The aerial should be folded up when in use and folded down for storage.

BNC INPUT Connectors:

The **Portable Wireless Trigger™ Transmitter** and **Portable Wireless Trigger™ Receiver** can accept various input and output connections through the 4 **BNC** connectors. Please see **Section 2.6** for more information.

SELECT TRIG. Button + TEST SIGNAL Button:

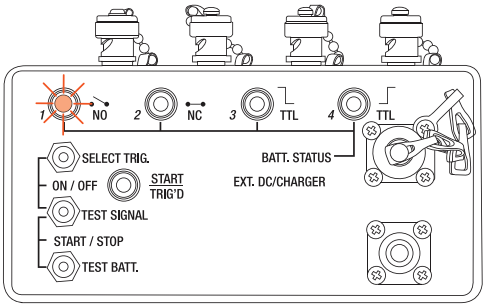
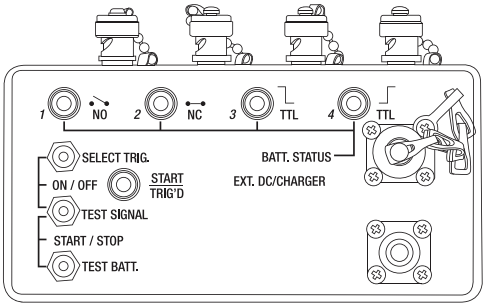
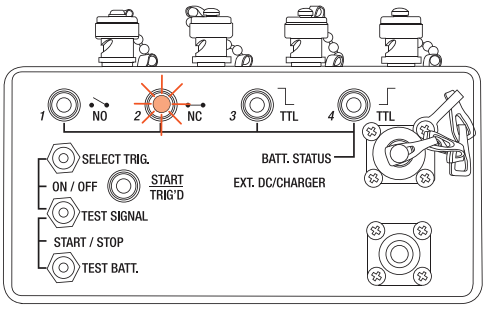
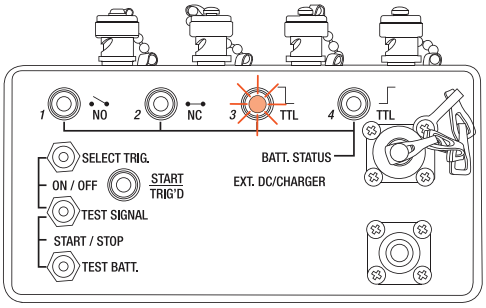
Press these 2 buttons together to turn on the **Portable Wireless Trigger™ Transmitter** or the **Portable Wireless Trigger™ Receiver.** Press these 2 buttons again, to turn off the **Portable Wireless Trigger™ Transmitter** or the **Portable Wireless Trigger™ Receiver.**

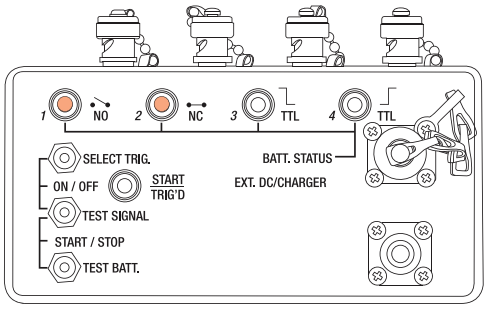
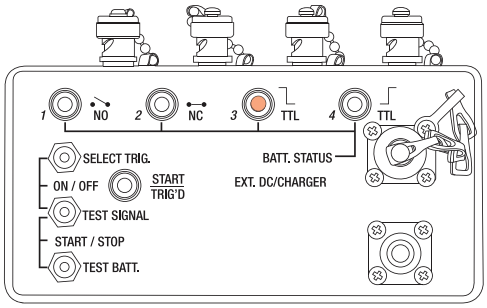
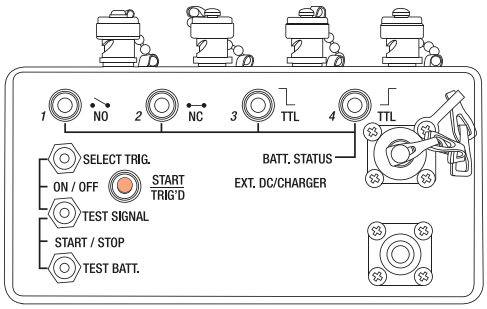
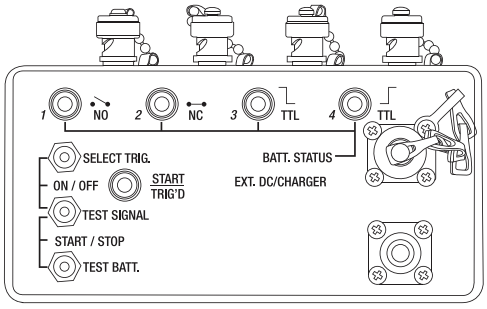
TEST SIGNAL + TEST BATTERY Button:

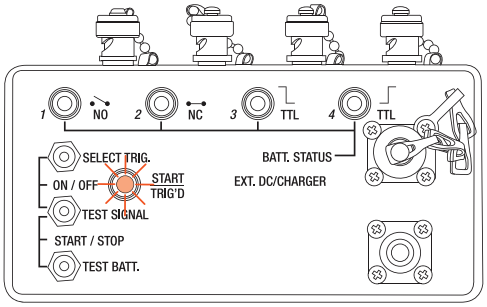
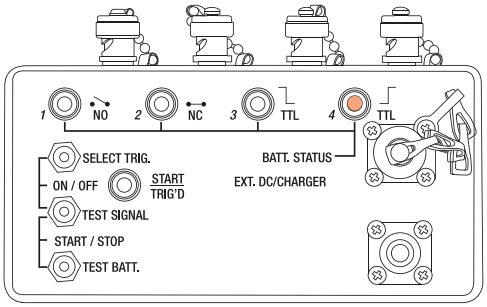
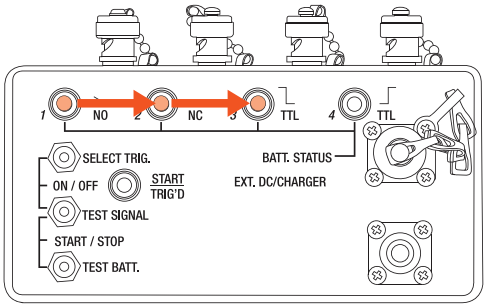
Press these 2 buttons together to make the **Portable Wireless Trigger™ Transmitter or the Portable Wireless Trigger™ Receiver** start waiting for a **Trigger.** Press these 2 buttons together for a second time to stop waiting for a **Trigger**.

2.6 Operational Matrix

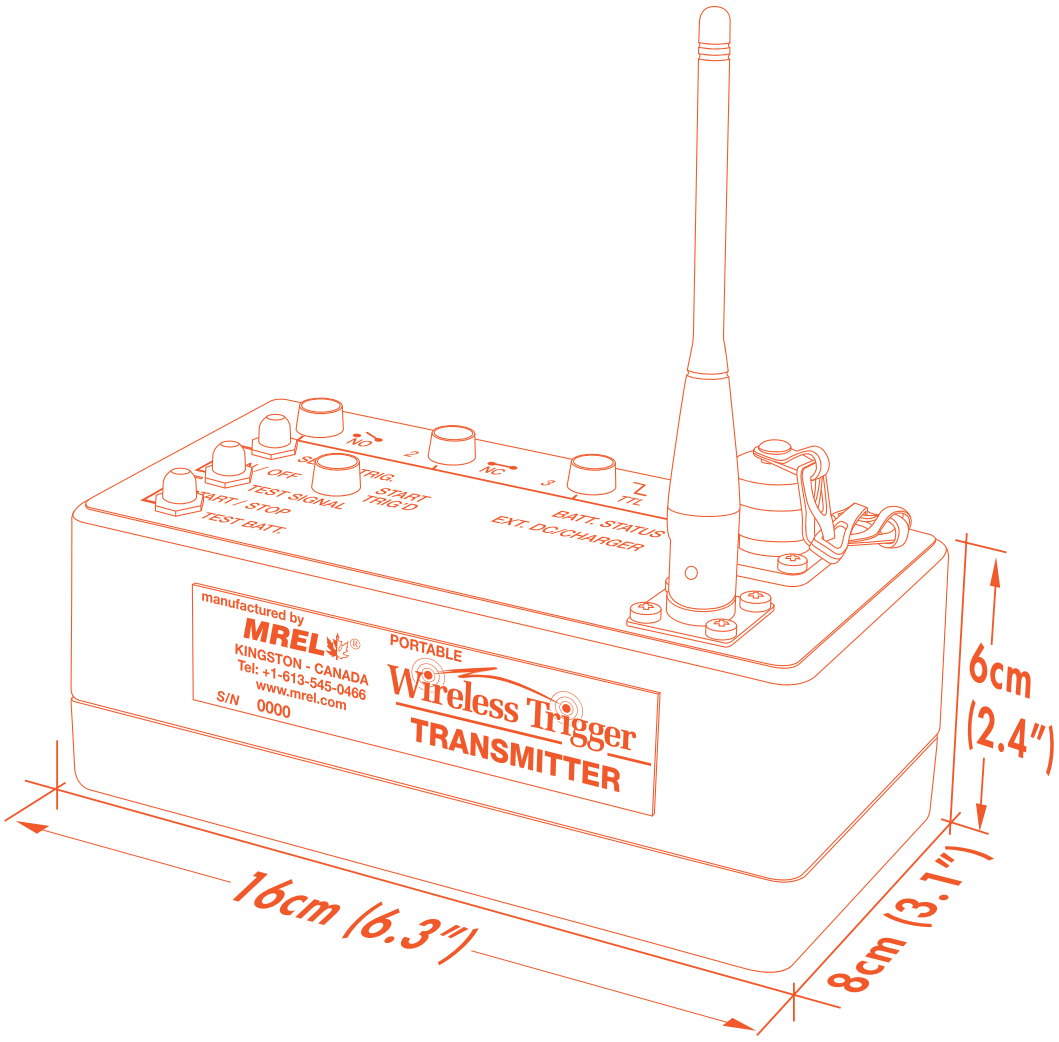
Light steady: ● Light blinking: ✳

TASK	DEVICE	PROCEDURE	INDICATORS	
Power on the unit	Transmitter & Receiver	SELECT TRIGGER Button + TEST SIGNAL Button pressed simultaneously.	LED 1, LED 2, LED 3, or LED 4 flashing slowly depending on which trigger mode has been set.	Trigger mode 1 has been set in this example. 
Power off the unit	Transmitter & Receiver	SELECT TRIGGER Button + TEST SIGNAL Button pressed simultaneously.	All indicators are off.	
To select Trigger Mode	Transmitter	SELECT TRIGGER Button pressed repeatedly to make a change.	Changes between LED 1, LED 2, LED 3, or LED 4 flashing slowly depending on trigger input mode required.	Cycles between LED 1 to LED 4. Trigger mode 2 choosen in this example. 
	Receiver	SELECT TRIGGER Button pressed repeatedly to make a change.	Changes between LED 1, LED 2, LED 3, or LED 4 flashing slowly depending on trigger output mode required.	Cycles between LED 1 to LED 4. Trigger mode 3 choosen in this example. 

To test the signal between the Transmitter and Receiver(s)	Transmitter	TEST SIGNAL Button pressed to begin signal strength test. TEST SIGNAL Button pressed again to end test.	LED 1, LED 2, LED 3, LED 4 will be illuminated depending on # of Receivers found. If no Receiver was found, then lights will cycle from LED 1, 2, 3 and 4 repeatedly.	2 Receivers have been found in this example. 
	Receiver	TEST SIGNAL Button pressed to begin signal strength test. TEST SIGNAL Button pressed again to end test.	LED 1, LED 2, LED 3, LED 4 will be illuminated depending on the address of the Receiver being tested. If no Transmitter was found, then lights will cycle from LED 1, 2, 3 and 4 repeatedly.	In this example, this Receiver is at address 3. 
Start waiting for a trigger	Transmitter & Receiver	TEST SIGNAL Button + TEST BATT. Button pressed simultaneously.	START/TRIG'D LED Indicator will be illuminated.	
Stop waiting for a trigger	Transmitter & Receiver	TEST SIGNAL Button + TEST BATT. Button pressed simultaneously.	START/TRIG'D LED Indicator will not be illuminated.	

Triggered Event	Transmitter & Receiver		START/TRIG'D LED Indicator will be flashing. To cancel, press STOP (B2 + B3).	
Test Battery	Transmitter & Receiver	Press TEST BATT. Button.	LED 4 = 76% to 100% charged. LED 3 = 51% to 75% charged. LED 2 = 26% to 50% charged. LED 1 = Less than 25% charged. LED 1 Flashing = Unit must be recharged.	In this example, the unit is 76% to 100% charged. 
Battery Recharging	Transmitter & Receiver		LED 1 to 4 will cycle from 1 to 4 while the unit is being recharged.	

Chapter 3
Field Operations



Overview

This chapter provides instructions on using the Portable Wireless Trigger™ in the field at a mine blast.

3.1 Introduction

Before using the **Portable Wireless Trigger™ Transmitter** and **Receiver** in the field, be sure to have gone through Section 2.2 which should be completed in an office setting. Also be sure that the **Portable Wireless Trigger™ Transmitter** and **Receiver** are both full charged.

3.2 Selecting a Position

The position of the **Portable Wireless Trigger™ Transmitter** and **Receiver** is very important. It can sometimes be difficult to select an ideal location due to a lack of suitable elevation above the height of the blast, or obstructions in the line of sight. This can usually be overcome by careful location choice. When selecting a location it is of utmost importance to ensure the safety of all personnel on-site, and to ensure the survivability of instrumentation.

The range limit between the **Portable Wireless Trigger™ Transmitter** and **Receiver** is **500m (1640 ft.)** so please be sure that the distance between the **Transmitter** and **Receiver** is at this range or less. If possible, perform the **Test Signal** test to ensure a strong signal between the **Transmitter** and **Receiver**.

MREL always recommends the use of proper sheltering from flyrock to protect the **Portable Wireless Trigger™ Transmitter** from damage. The User has the option of using a trigger that is associated with the blast event (i.e. a **Make Trigger** wrapped over the end of a detonator). If the User intends to trigger the recording manually, the push-button trigger device can be used.

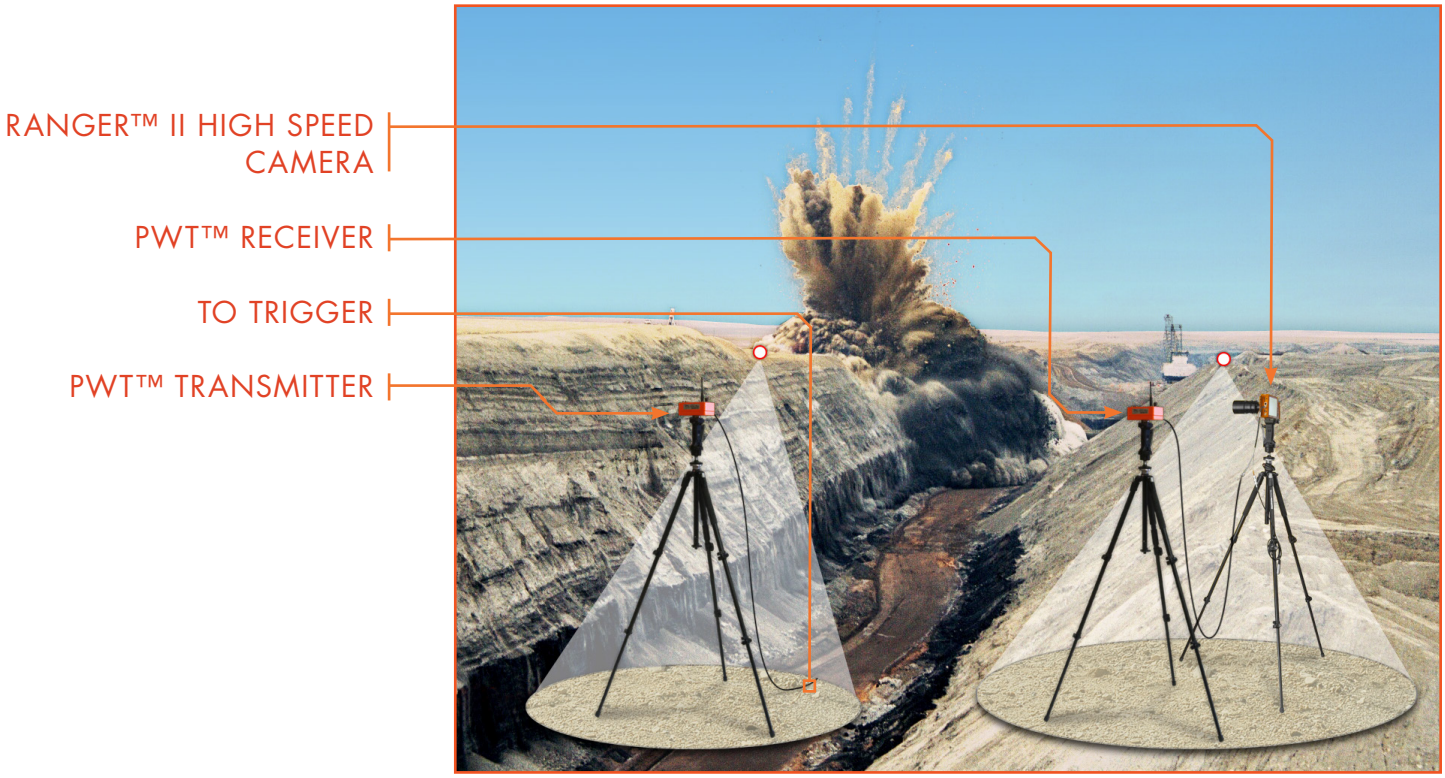
3.3 Field Setup

The **Portable Wireless Trigger™ Transmitter** and **Receiver** have been designed to assembly quickly and easily in the field. The complete setup of the system is detailed in **Chapter 2**.

3.3.1 Receiver Setup

Select an appropriate area for the **Portable Wireless Trigger™ Receiver** and connected equipment depending on your requirements. As shown in the image on the next page, the equipment attached to the **Portable Wireless Trigger™ Receiver** is a high speed video camera and as such, its position in the field has been chosen to maximize the field of view for the blast.

1. Once a location has been chosen, setup the **Tripod**. If the **Tripod** is unstable, it is suggested that a weighted object be suspended from the center of the **Tripod**. The **Tripod** legs should be set as short as possible to increase stability and to mitigate **Portable Wireless Trigger™** movement as a result of round vibration.
2. Connect the **Portable Wireless Trigger™ Receiver** to the **Grip Action Ball Head**.
3. Connect the the equipment that will be triggered to the correct BNC connector on the **Portable Wireless Trigger™ Receiver**.
4. Turn on the **Portable Wireless Trigger™ Receiver**.
5. Select the correct **Trigger** output mode by pressing the **SELECT TRIG** button.
6. Press the **TEST SIGNAL** and **TEST BATT.** buttons together to start the **Portable Wireless Trigger™ Receiver**.
7. Turn on the equipment attached the to **Portable Wireless Trigger™ Receiver** (for example, a high speed video camera).



Make sure this equipment is ready to accept the trigger signal from the **Portable Wireless Trigger™ Receiver**.

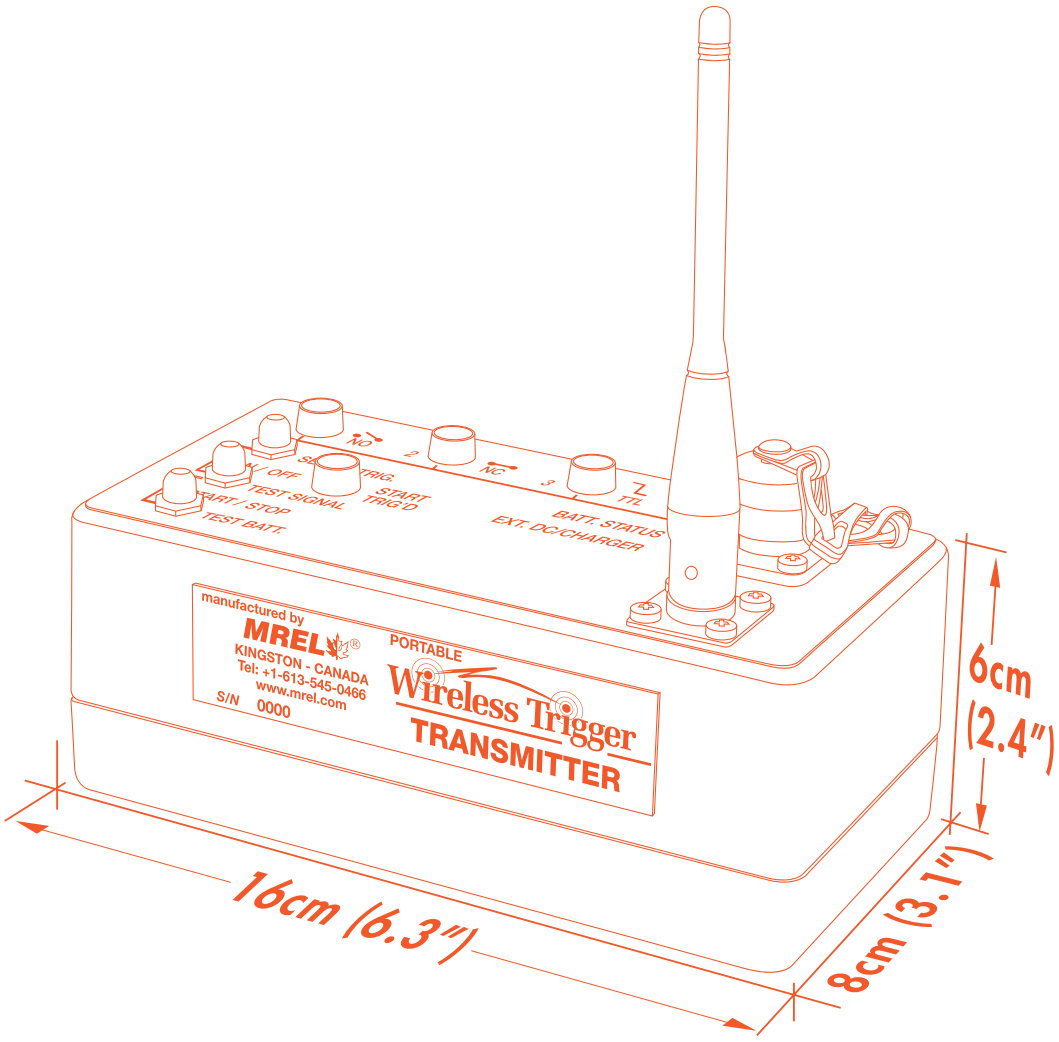
7. The **Portable Wireless Trigger™ Receiver** is now ready.

3.3.2 Transmitter Setup

Again, select an appropriate area for the **Portable Wireless Trigger™ Trasmitter**. As shown in the image on the next page, the **Portable Wireless Trigger™ Trasmitter** has been placed next to the blast and will be triggered by a line break caused by the blast itself. Instead of using this setup, the **Portable Wireless Trigger™ Trasmitter** can be setup with the **Trigger Switch** and placed close to the operator. The **Trigger Switch** is then pressed by the operator when the blast occurs.

1. Once a location has been chosen, setup the **Tripod**. If the **Tripod** is unstable, it is suggested that a weighted object be suspended from the center of the **Tripod**. The **Tripod** legs should be set as short as possible to increase stability and to mitigate **Portable Wireless Trigger™** movement as a result of round vibration.
2. Connect the **Portable Wireless Trigger™ Transmitter** to the **Grip Action Ball Head**.
3. Attach the trigger wire (or **Trigger Switch)** to the correct BNC connector on the **Portable Wireless Trigger™ Transmitter**.
4. Turn on the **Portable Wireless Trigger™**.
5. Select the correct **Trigger** type by pressing the **SELECT TRIG** button.
6. As the **Portable Wireless Trigger™ Receiver** has been setup already, test the signal between the **Transmitter** and **Receiver** by pressing the **TEST SIGNAL** button on the **Portable Wireless Trigger™ Transmitter**. The **Portable Wireless Trigger™ Receiver** should be found. If not, the distance between the **Portable Wireless Triggers™** could be too great or there is no line of site between the **Portable Wireless Triggers™**.
7. Press the **TEST SIGNAL** and **TEST BATT.** buttons together to start the **Portable Wireless Trigger™ Transmitter**.
8. The **Portable Wireless Trigger™ Transmitter** is now ready for the trigger signal.

Chapter 4
Contacting MREL for Technical Support



4.1 Contacting MREL

MREL Group of Companies Limited

Blasting Instrumentation Team

5-779 Sir John A MacDonald Blvd.
Kingston, Ontario K7L 1H3
Canada

Toll Free Canada/USA: +1-877-544-MREL
Tel: +1-613-545-0466

Email: support@mrel.com

Webpage Support: www.mrel.com/contact.html

MREL looks forward to providing you with assistance.

Appendix A: Portable Wireless Trigger™ Specifications

Wireless Trigger RF Specifications

Frequency Ranges	2.4 GHz - this radio frequency approved for use throughout the world. Utilizes Frequency Hopping Spread Spectrum Technology to provide superior signal reliability.
Transmission Power and Range	50 mW, 500 m (1640 ft.) range "line of sight" with standard portable dipole antenna (shown in photographs).
Trigger Response Time	Variable 50 - 150 milliseconds. Lower custom response times available for applications with a firm distance between **Transmitter** and **Receiver**(s).

Portable Wireless Trigger™ Transmitter Details - One Transmitter can simultaneously communicate with up to 4 Portable Wireless Trigger™ Receivers.

Connections	Four BNC for connecting trigger input signal: normally open circuit (triggers on short circuit), normally closed circuit (triggers on open circuit), TTL trigger on falling edge, TTL trigger on rising edge. Charger/12 VDC input. Tripod mount.
Push Buttons and LEDs	Pressing the **SELECT TRIG** and **TEST SIGNAL** buttons simultaneously turns the power **ON/OFF**. **SELECT TRIG**: allows Operator to select one of the four trigger outputs as indicated by the four LEDs. **TEST BATT:** pressing this button indicates the internal battery strength as indicted by the four LEDs. **TEST SIGNAL:** pressing this button indicates whether or not communications has been established with the **Transmitter** as indicated by the **LED** marked with the **Transmitter**'s number. Pressing the **TEST SIGNAL** and **TEST BATT** buttons simultaneously starts the **Transmitter** and **Receiver**(s) actively waiting for a trigger signal as indicated by the LED. This can also be accomplished from the **Transmitter**.
Power	Internal rechargeable NiCad battery pack providing 8 hours of stand-by operation plus 8 hours of active transmission operation on a full charge. Full battery recharging is obtained overnight. The **Transmitter** can also be operated from external 6 to 12 VDC.
Components Provided	**Transmitter**, push button trigger switch, 120 or 240 VAC Battery Charger, adapter for external 6 to 12 VDC.
Size and Weight	**Transmitter**: 16 x 8 x 6 cm (6.3 x 3.1 x 2.4 in.) 1.5 kg (3.3 lbs.).
Environmental	Fully operational at -40 to +80 °C (-40 to +185 °F). Snow, rain, dust and sand proof.

Portable Wireless Trigger™ Receiver Details - Each Receiver has a unique identification number, electronically matched with one Transmitter.

Connections	Four BNC for connecting trigger output signal: Normally open circuit (closes when triggered), normally closed circuit (opens when triggered), TTL trigger on falling edge, TTL trigger on rising edge. Charger/12 VDC input. Tripod mount.
Push Buttons and LEDs	Pressing the **SELECT TRIG** and **TEST SIGNAL** buttons simultaneously turns the power **ON/OFF**. **SELECT TRIG**: allows Operator to select one of the four trigger outputs as indicated by the four **LEDs**. **TEST BATT**: pressing this button indicates the internal battery strength as indicted by the four **LEDs**. **TEST SIGNAL**: pressing this button indicates whether or not communications has been established with the **Transmitter** as indicated by the **LED** marked with the **Transmitter's** number. Pressing the **TEST SIGNAL** and **TEST BATT** buttons simultaneously starts the **Transmitter** and **Receiver(s)** actively waiting for a trigger signal as indicated by the **LED**. This can also be accomplished from the **Transmitter**.
Power	Internal rechargeable NiCad battery pack providing 8 hours of stand-by operation plus 8 hours of active transmission operation on a full charge. Full battery recharging is obtained overnight. The **Receiver** can also be operated from external 6 to 12 VDC.
Components Provided	**Receiver**, 120 or 240 VAC Battery Charger, adapter for external 6 to 12 VDC.
Size and Weight	**Receiver**: 16 x 8 x 6 cm (6.3 x 3.1 x 2.4 in.) 1.5 kg (3.3 lbs.).
Environmental	Fully operational at -40 to +80 °C (-40 to +185 °F). Snow, rain, dust and sand proof.

Wireless Trigger Guarantee and Warranty

Satisfaction Guarantee and Warranty	**MREL's** 30 day Money-Back Satisfaction Guarantee. **MREL's** 1 year Comprehensive Parts and Labour Warranty.

Part Number Details for Re-Ordering

1-51-01	**Portable Wireless Trigger™** (c/w **Transmitter** and **Receiver**, 2.4 GHz, charger).
1-51-03	**Portable Wireless Trigger™** Additional **Receiver** (2.4 GHz, charger).

MREL is committed to product innovation; accordingly product may undergo specification improvements without notice.

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