

# WICKED AIR SPORTZ

## ***Equalizer***<sup>TM</sup>

### Usage Manual for The Smart Parts Impulse

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## **USAGE**

The Equalizer has numerous features, which can be a bit overwhelming to those that are not use to having so much flexibility. However, every possible step has been taken to make sure that the use of this product is extremely simple.

### **Turning on the Equalizer**

To turn on the Equalizer, press and hold the power button (located on the back of the grip frame tray) for ½ of a second, and release it. The LED should light orange and stay that way for several seconds after releasing the button.

### **Turning off the Equalizer**

To turn off the Equalizer, press and hold the power button until the LED becomes solid red, and then release the button.

### **Bypassing the Eye System**

In order to be able to “dry fire” the marker, the eye system must be bypassed. When the eye system is enabled, the marker will not fire unless there is something in the breech. To bypass the eye system, press and hold the power button for ½ second. The LED will blink orange, indicating that the eye system has been bypassed. Repeating this procedure will enable the eye system.

### **General Usage Tips**

The LED boot sequence is as follows: solid orange (booting), followed by either solid green (normal mode) or solid red (competition mode).

The rate of fire is limited only by how fast the pneumatics will cycle, how fast you can pull the trigger, and how fast your loader can feed your marker.

Because the Equalizer can easily exceed the feed rate of any loader in existence, it is recommended that you use a force-feed type of loader for the best possible performance.

Using a reflective bolt does offer better performance if programmed in "Eye Mode 2". Some black bolts, typically made of nylon, absorb infrared and require the use of "Eye Mode 1". To determine if your bolt is reflective or not, simply push it front of the eye and see if the LED status changes to 'ball loaded' (flickering green). If it does not change, then your bolt is not reflective and the Eye Mode must be set to Eye Mode 1.

### **LED Colors and Meanings**

The LED used with the Equalizer can light up in one of 3 different colors. The Equalizer uses this to indicate to the user when certain events are occurring. This is a breakdown of what the LED states represent:

Blinking Green (once per second): Normal operation, anti-chop system is enabled, Eye Mode 1 (rate of fire capped at user preset).

Blinking Green (twice per second): Normal operation, anti-chop system is enabled, Eye Mode 2 (unlimited rate of fire – requires a reflective bolt).

Blinking Orange: Normal operation, anti-chop system is disabled.

Blinking Red: Battery is low.

Red/Green toggle: There is an error with the anti-chop system (white bolt or simulate modes only).

Flickering green: object is in the breach.

### **Tournament Lock**

It is possible to put the Equalizer into a tournament lock (COMPETITION) mode. You can do this by making sure the power switch is in the off position, grounding (connecting) the two center pins on the Equalink interface connector, and then moving the power switch to on position. Each time you 'reboot' with the pins grounded, the NORMAL and COMPETITION modes will toggle. The marker will not fire with the jumper in place! Removing the jumper will allow the normal operation of the marker.

You can also change the tournament lock mode using the Equalink.

It is necessary to remove the battery after changing the tournament lock or using the Equalink to alter settings or update firmware.

## **Trigger Programming**

The Dwell, Debounce™, Eye Mode, BIP Delay™, ROF Cap, and Eye Sensitivity functions are programmable by following these instructions:

Make sure the power switch is in the off position. During programming, make sure that your marker has a barrel condom in place and the air supply shut off. Although it is not possible to fire the marker while in programming mode, it is always good to practice safe marker handling.

Pull the trigger, and hold it in the back position. Now, press and hold the power button for ½ second. During this time, the LED will light up green.

Now, release the trigger. The LED will light red. The marker is now in "trigger programming mode".

Pulling and releasing the trigger will change the LED color, advancing to the next programming feature. This is also known as the "programming menu". The following colors equate to the feature selected:

Solid Red: Dwell programming mode.

Solid Green: Debounce™ programming mode.

Solid Orange: Eye Mode programming mode.

Flickering Red: Ball In Place (BIP) Delay™ programming mode.

Flickering Green: Rate of Fire (ROF) cap programming mode.

Flickering Orange: Eye Sensitivity programming mode.

Once you have reached the last feature (flickering orange), an additional trigger pull will start the sequence of colors over again. This is also known as the "programming menu start".

When you decide which programming feature you want to change, pull the trigger and hold it until the LED goes out, and then release the trigger. There will be a 2 second pause, and then the LED will flash the same color of the programming mode you are in (red=Dwell, green=Debounce™, orange=eye mode, etc.) the number of times that represents something associated with that feature. For example, if you were programming the Debounce™ and the settings were the factory default (10ms), you would see the LED flash green 10 times in a row, indicating the Debounce™ is set to 10ms. The flashing of the LED shows you the current setting **before** you change it.

Once the LED is done flashing, there is a 5 second time period to begin programming the new setting. To change the setting, pull and release the trigger the number of times equal to how you wish to program the feature. On each pull of the trigger, the LED will light up (indicating that the pull has been detected). If you decide not to change the feature setting at all, simply do not touch the trigger at all for 5 seconds. The LED will then blink green/red alternately to indicate there was a programming error, and then go back to the programming menu. The feature setting will not be changed.

Once you have pulled and released the trigger the number of times you wanted the feature setting to be, do not touch the trigger. After 5 seconds, the LED will flash a rainbow of colors indicating that the feature setting change has been accepted. After this, the marker is in the programming menu again. If you program a feature outside of its specifications (for example, programming the dwell to 1ms) the LED will blink green/red alternately indicating that there was a programming error.

Each feature and its programming is described in detail below:

### ***Dwell***

Trigger programming for changing the dwell is different than any other feature as there are two steps involved instead of one due to allowing for .1ms (tenths) increments.

After selecting the Dwell programming feature, and once the LED stops flashing, you can now pull and release the trigger once for every FULL 1ms of time you want the dwell to be. Once you have pulled the trigger the number of times you want the full milliseconds to be, after a 2 second pause the LED will blink orange and then off. You can then pull the trigger again, but this time with each trigger pull being  $1/10^{\text{th}}$  of a millisecond (.1ms). So, if you wanted to set the dwell to be 6.3ms, you would select the dwell programming mode by pulling/releasing the trigger until the LED was solid red. Next, you would hold the trigger until the LED went out. Next, the current dwell setting (say 7.5ms) would be shown as 7 red flashes, a pause, an orange flash, a pause, and then 5 red flashes. The orange flash is there to separate the full milliseconds from the  $1/10^{\text{th}}$  of a millisecond (.1ms) intervals.

The default dwell is 7.0ms. The lowest allowable dwell time is 4.0ms and the longest allowable time is 50.0ms. According to the solenoid manufacturer, the dwell should never be below 6.0ms for proper operation.

## ***Debounce™***

Pull and release the trigger once for every 1ms of time you want the setting to be. For example, if you were programming the Debounce to 5ms, you would pull and release the trigger 5 times. The default Debounce™ setting is 10ms.

## ***Eye Mode***

Pull and release the trigger the number of times necessary to set the Eye Mode to what you want to use.

The following is a list of the possible Eye Modes and the flashes (also trigger pulls required):

- 1 flash - Bypassed mode
- 2 flashes - Eye Mode 1 (uses ROF cap)
- 3 flashes - Eye Mode 2 (monitors bolt)
- 4 flashes - Simulate mode

If you pull and release the trigger more than 4 times, then the LED will toggle green/red alternately to indicate there was a programming error, and then go back to the programming menu. The default Eye Mode is 1.

## ***BIP Delay™***

Pull and release the trigger once for every 1ms of time you want the setting to be. For example, if you were programming the BIP Delay™ to 5ms, you would pull and release the trigger 5 times. The default BIP Delay™ setting is 10ms.

## ***ROF Cap***

Pull and release the trigger once for the number of times you want the Rate of Fire (ROF) cap to be. For example, 20 pulls/releases would be 20 bps. The ROF cap is only used with Eye Mode 1. In Eye Mode 2, the rate of fire is unlimited. The default ROF Cap is 20 bps.

## ***Eye Sensitivity***

Pull and release the trigger once for the number of times you want the Eye Sensitivity to be. Each trigger pull represents a sensitivity decrease. So, a setting of 5 would make the eye more sensitive than a setting of 6. The default Eye Sensitivity is 10.

## ***Programming Complete***

Once you pulled and released the trigger the number of times necessary to set the function, wait a few seconds. The LED will flash red/green/orange in rapid succession (numerous times) to let you know that the new setting has been saved. After this, the LED will return to the color representing what the current programming menu item is. At this point, you can once again pull and release the trigger to toggle between Dwell, Debounce™, Eye Mode, BIP Delay™, ROF Cap, and Eye Sensitivity programming modes.

You can perform a complete reset, restoring all settings to the factory defaults. To do this, just hold down the trigger for 6 full seconds. It does not matter what programming mode you are currently in. The LED will start flashing red, letting you know that a reset operation is being performed. After this occurs, you will be back to the programming starting point. DO NOT release the trigger until you see the LED flashing red or the reset will not occur.

## **Computer Programming Mode (Equalink)**

Just as with all other Equalizer boards, the Impulse version has an Equalink port. This port allows customers to fine tune settings as well as download the latest firmware updates for the board from our website (free of charge!)

To get into computer programming mode, hold the trigger and press the power button for ½ second and release the power button... but not the trigger! Keep holding the trigger until the LED switches from the normal green color to off. The Equalizer is now ready to connect to a PC. If you accidentally get into computer programming mode, you can get out by pressing and holding the power button until it turns RED and release it. If your trigger adjustment setscrew is adjusted too far in so that it depresses the trigger switch when in the released position, the marker will go into computer programming mode when it is turned on!

## **Terminology**

### ***Dwell***

Dwell is the amount of time that the solenoid will be activated. This time is measured in milliseconds (1/1000<sup>th</sup> of a second). The user can alter the Dwell only when in NORMAL mode. In COMPETITION mode, the Dwell menu item is not available. Possible values are from 4.0ms to 50.0ms. The factory default is 7.0ms. Changes are made in .1ms units via the trigger.

Increasing your Dwell will increase the velocity of your marker. If you are experiencing a great variance in your chrono results, try increasing your Dwell and lowering your high pressure regulator. If your dwell is too low, consistency will suffer greatly.

### ***Debounce***

Debounce is the amount of time the trigger switch must be stable in the up position before checking for another trigger pull. This time is measured in milliseconds. The user can alter the Debounce only when in NORMAL mode. In COMPETITION mode, the Debounce menu item is not available. Possible values are from 2ms to 50ms. The factory default is 10ms. Changes are made in 1ms units.

If you find that your marker is double firing, increase the Debounce time. To make your marker fire faster due to being more responsive to the trigger, decrease the Debounce time.

### ***Eye Mode***

The Eye Mode is can be set to one of four different modes:

Bypass - The anti-chop system is disabled. When this occurs, the maximum rate of fire is limited to 13 balls per second to help prevent chopping of balls in the breech.

Eye Mode 1 – In this mode, the marker will not fire unless there is a ball in the breech. This mode uses a rate of fire cap to determine the speed of the cycling. The bolt is not monitored. Works with any type of bolt. **This is the default eye mode.**

Eye Mode 2 - In this mode, the marker will not fire unless there is a ball in the breech. This mode works by monitoring the bolt position, and thus the rate of fire is unlimited. This mode **requires** a bolt that is reflective to IR.

Simulate – In this mode, a ball is simulated to be in the breech. This allows you to fire the marker with just air, at the full speed that the marker is capable of firing! This mode can be used for practicing trigger pull methods, without wasting paint. **DO NOT SHOOT PAINT IN THIS MODE!**

### ***BIP Delay™***

The BIP Delay™ is a feature that allows you to adjust for the differences in the eye sensor, its installation, and the loader being used. If the sensor is installed correctly, and base of the sensor is blacked out (using a 'sharpie' or similar), the eye system will require very little BIP Delay™ when using a fast loader. When using a slower gravity-feed loader or if the eye sensor is not installed correctly, it may be necessary to have a longer BIP Delay™ to prevent balls from being chopped.

Possible values are from 1ms to 50ms. The factory default is 10ms. Changes are made in 1ms units.

### ***ROF Cap***

The rate of fire (ROF) cap sets the maximum cycle speed of the marker when Eye Mode 1 is used. Setting this value to low will reduce the usable speed of the marker. Setting this value too high can cause misfires if the marker pneumatics are very slow (stock configurations) and a reflective type of bolt is used. If a non-reflective bolt is used, the ROF cap should be set as high as possible.

Possible values are from 10 bps to 30 bps. The factory default is 20 bps. Changes are made in 1 bps units.

### ***Eye Sensitivity***

The eye sensitivity controls how sensitive the eye system is at detecting paint colors, textures, and motion. It also determines how sensitive the eye system is to ambient light (such as sunlight). Setting this value too low will cause problems if sunlight directly shines into the breech (either from the barrel or through the vertical feed).

Setting this value too high will ignore paintballs in the breech. The lower the value, the more sensitive the eye system will be.

Possible values are from 1 to 20. The factory default is 10. Changes are made in 1 unit increments.

### ***Reset***

This option will reset ALL of the settings to the factory default! If you find that you are having problems remembering the factory defaults, just use this option to reset your board and start over! The user can Reset the board only when in NORMAL mode.