

# WICKED AIR SPORTZ

***Equalizer™***

***Installation and Usage Manual  
For Dye Matrix DM4***

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## **Introduction**

Thank you for purchasing the Equalizer™ upgrade chip for the Dye Matrix DM4. This chip is a direct replacement for the stock chip found in the DM4. This chip will NOT work in any other Matrix.

Please read through this **entire** manual **before** you attempt the installation of your Equalizer™ upgrade chip!

## **Installation Requirements**

To install your Equalizer™ upgrade chip, you will need the appropriate sized Allen wrenches, a small flat blade screwdriver, and a flat, clean, work surface.

The installation of the Equalizer™ chip is not difficult. However, if after reading through this manual, you believe you cannot perform the installation, please seek someone who can assist you.

This manual should provide ample information and clarity to install this product.

## **Warranty Information**

The Equalizer™ upgrade chip carries a limited lifetime warranty. Units subject to improper installation, misuse, abuse, or modifications will not be covered under this warranty.

Wicked Air Sportz may at its discretion either repair or replace the unit. The customer will pay all freight charges to and from Wicked Air Sportz.

Wicked Air Sportz must be contacted to obtain a return authorization. Any product returned with authorization will be shipped back.

## **Liability**

By using this product, you agree to hold Wicked Air Sportz free from any type of liability either directly or indirectly due to the use of this product.

## **Legal Information**

The 'look and feel', and functionality of this product are protected by U.S. copyright laws. The terminology and feature names are protected under U.S. trademark laws. The terms WAS™, W.A.S.™, Equalizer™, Equalized™, Debounce™, Forced™, Delayed™, BIP Delay™, RAM Delay™, Bolt Delay™, and Simulate™ are trademarked by Wicked Air Sportz.

## **SECTION 1 – INSTALLATION**

### **Step 1 – Removing the Grip Panel**

Before disassembling the marker, make sure the marker power switch is in the off position, the barrel removed, and the air system off.

Using the proper sized Allen wrench, remove the three (3) screws that hold the right side rubber grip panel in place. Move the grip frame panel behind the trigger guard so it is completely out of the way. See Figure 1 for details. Remove the 9-volt battery and set it aside. **Do NOT remove or install any chip with battery still installed!**

### **Step 2 – Removing the Stock Chip**

Using a small flat blade screwdriver, carefully insert the tip of the blade into small space between the chip and the socket that the chip sits in. See Figure 3 for details. Make sure you do **not** apply any pressure from the screwdriver tip on the component located to the left of the chip!

Carefully rotate the screwdriver, causing the end of the chip to lift up away from the socket. See Figure 4 for details.

Remove the screwdriver and do the same procedure for the other end of the chip. See Figure 5 for details.

The chip should now easily come out of the socket by pulling straight up on the chip. See Figure 6 for details.

### **Step 3 – Installing the Equalizer Upgrade Chip**

The chip has a notch at one end, which denotes the direction it should be inserted. Referring to figures 7 and 8, carefully insert the Equalizer chip into the socket, making sure that all pins are inserted into the matching socket holes and that the notch is oriented to the right (front of the marker). Press down on the chip to fully seat it in the socket. Extreme care must be taken so that no pins are bent during the installation process! Re-install 9-volt battery and reassemble the grip frame.

### **DIP Switch Functions**

#### **DIP Switch 1**

DIP Switch 1 in the ON position turns on the ABS programming. Although ABS is not necessary with a properly maintained marker, we have provided this option for cases when there are problems with the pneumatics that require ABS in order to function normally. The computer determines the ABS time automatically. It is **not** possible to have a 'hot' first shot with ABS if your marker is setup correctly! Recommended setting: ON

#### **DIP Switch 2**

DIP Switch 2 in the ON position puts the marker in MAINTENANCE mode. The marker will not function normally in this mode. This mode is for testing only! Please see the usage section of this manual for a description of this mode.

#### **DIP Switch 3**

DIP Switch 3 in the ON position makes LED intensity the highest possible. This is useful when playing in extreme sunlight conditions. This mode will use considerably more power from the battery.

## DIP Switch 4

DIP Switch 4 in the ON position enables COMPETITION mode. This mode is required for NPPL, PSP, and other tournaments. This disables many of the trigger programming features. You can tell if the marker is in COMPETITION mode or not by the LED boot up sequence.



Figure 1 – Grip cover screws removed and grip panel folded back

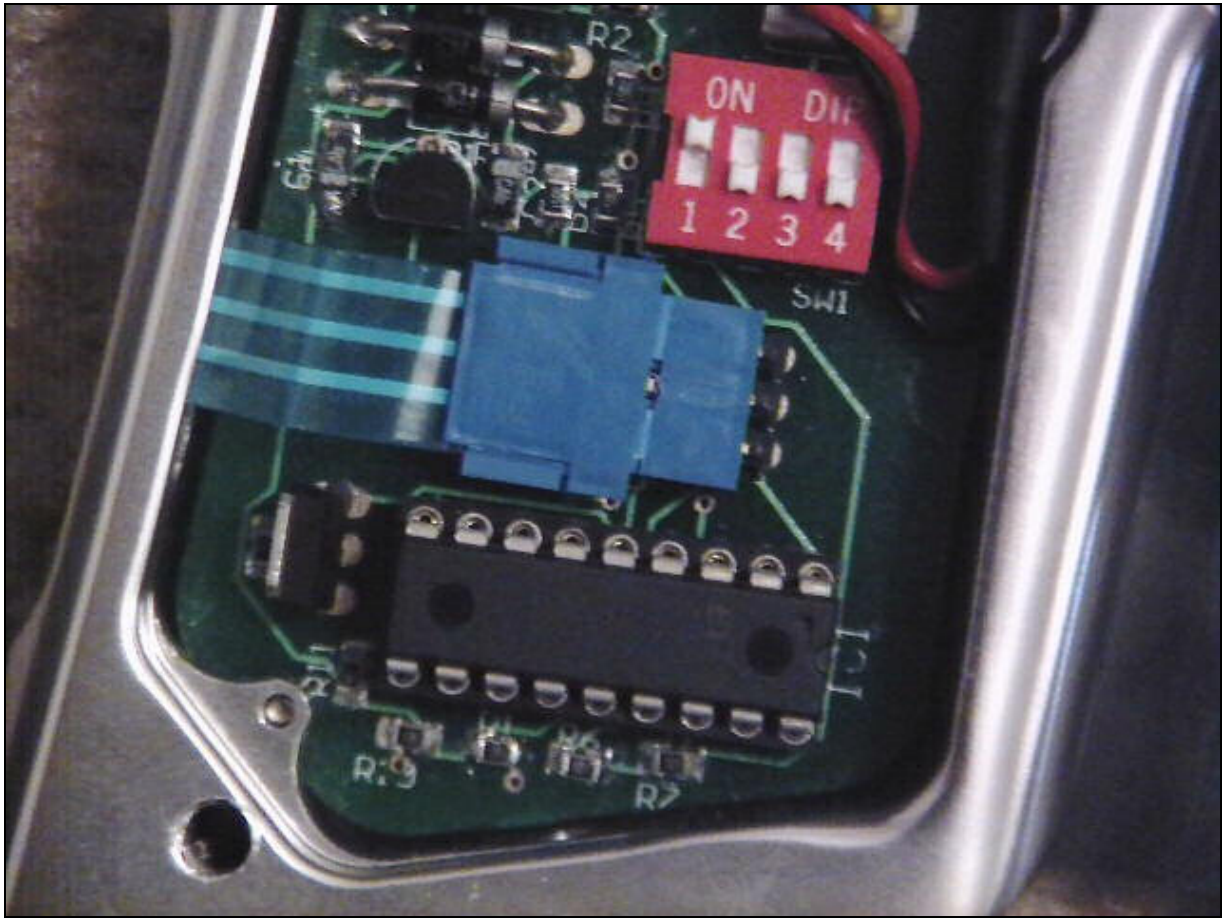


Figure 2 – Stock chip to be removed

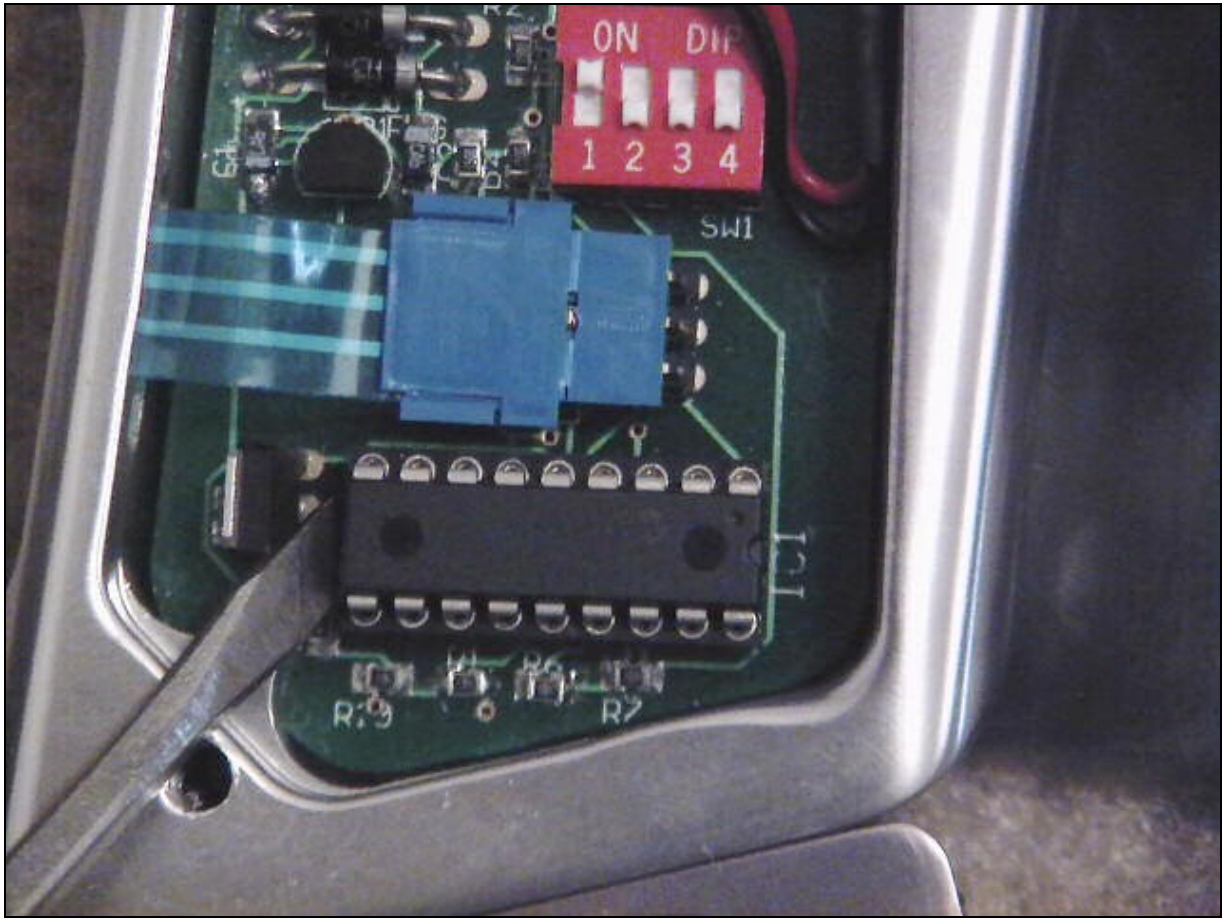


Figure 3 – Use flat blade screwdriver remove the chip

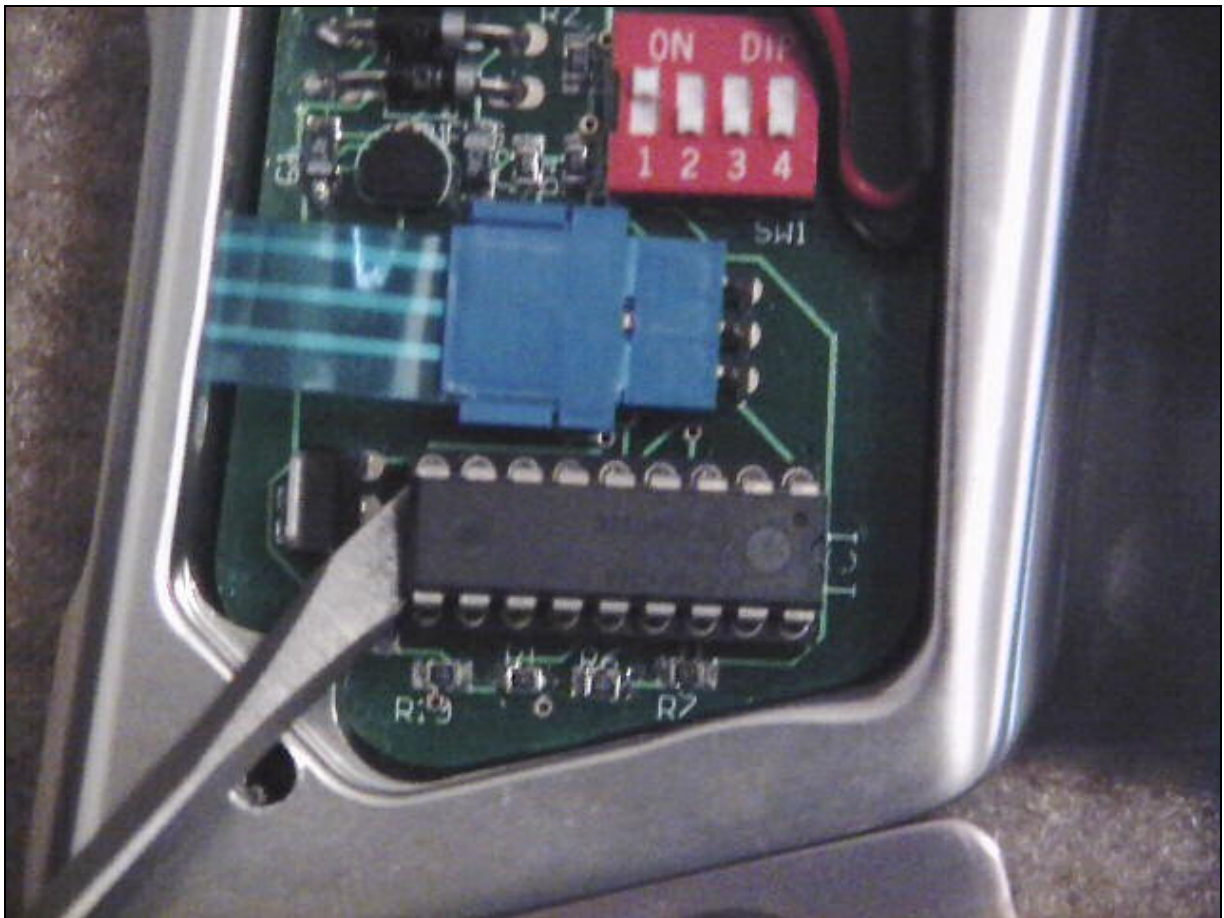


Figure 4 – Rotate screwdriver to pry up left end of chip



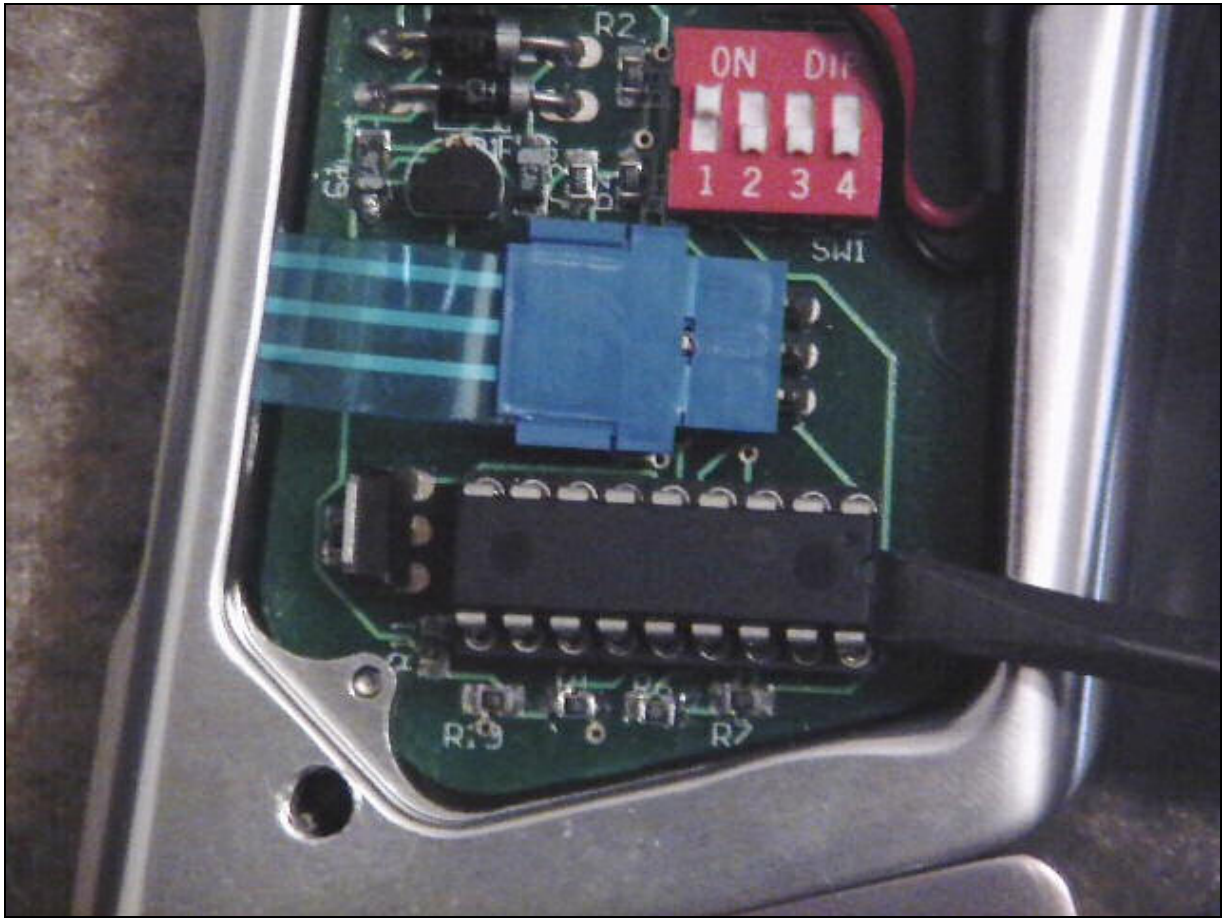


Figure 5 – Repeat procedure for the right side of the chip

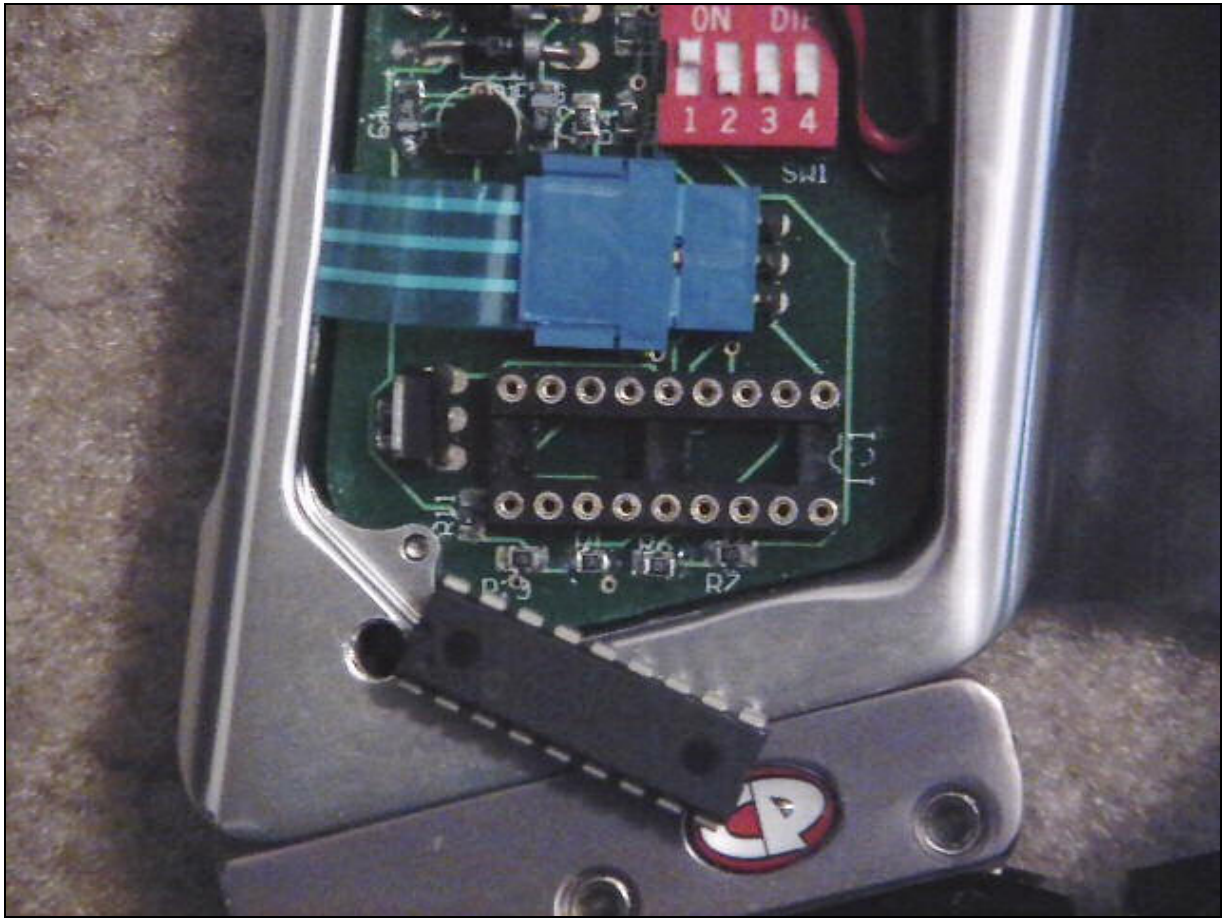


Figure 6 – Stock chip removed from socket

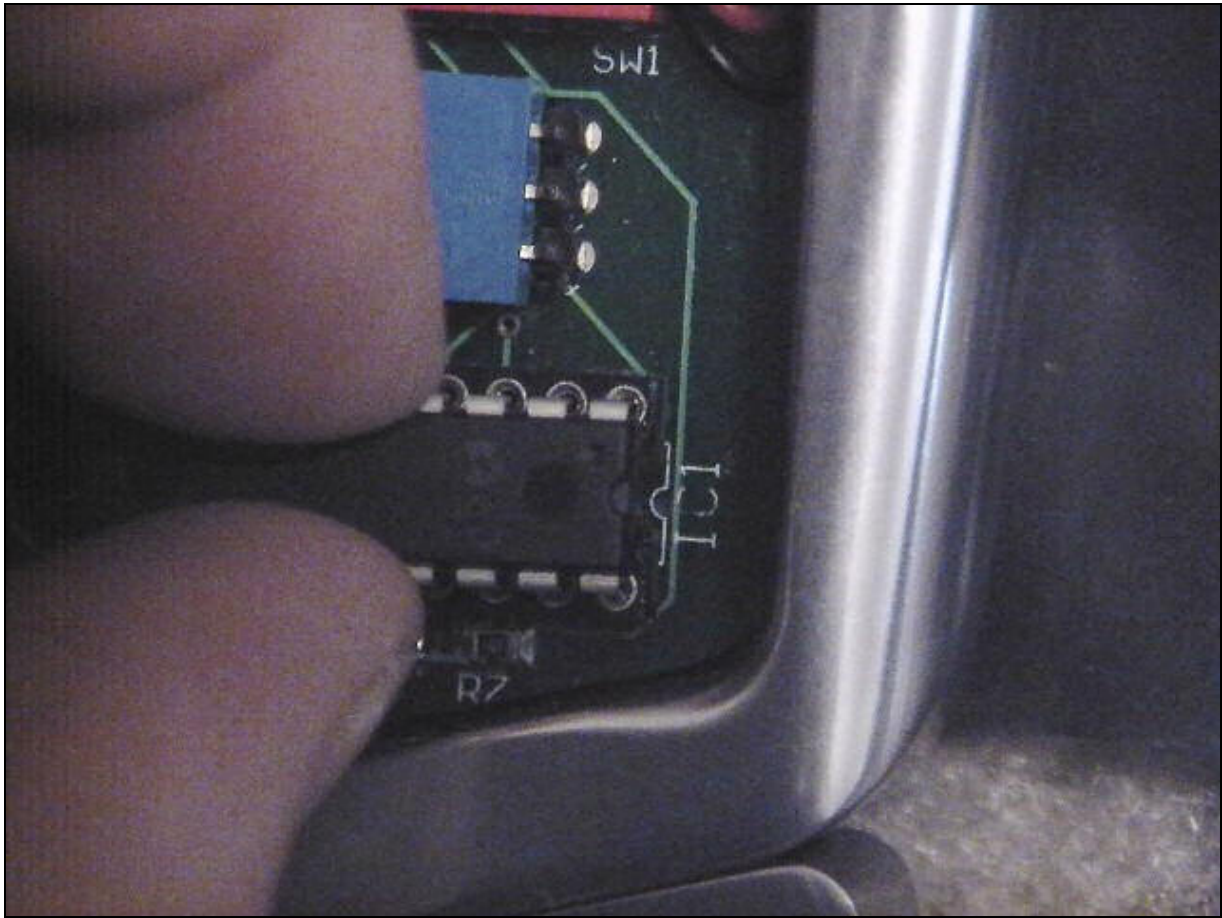


Figure 7 – Insert Equalizer chip in socket with notch facing to the right

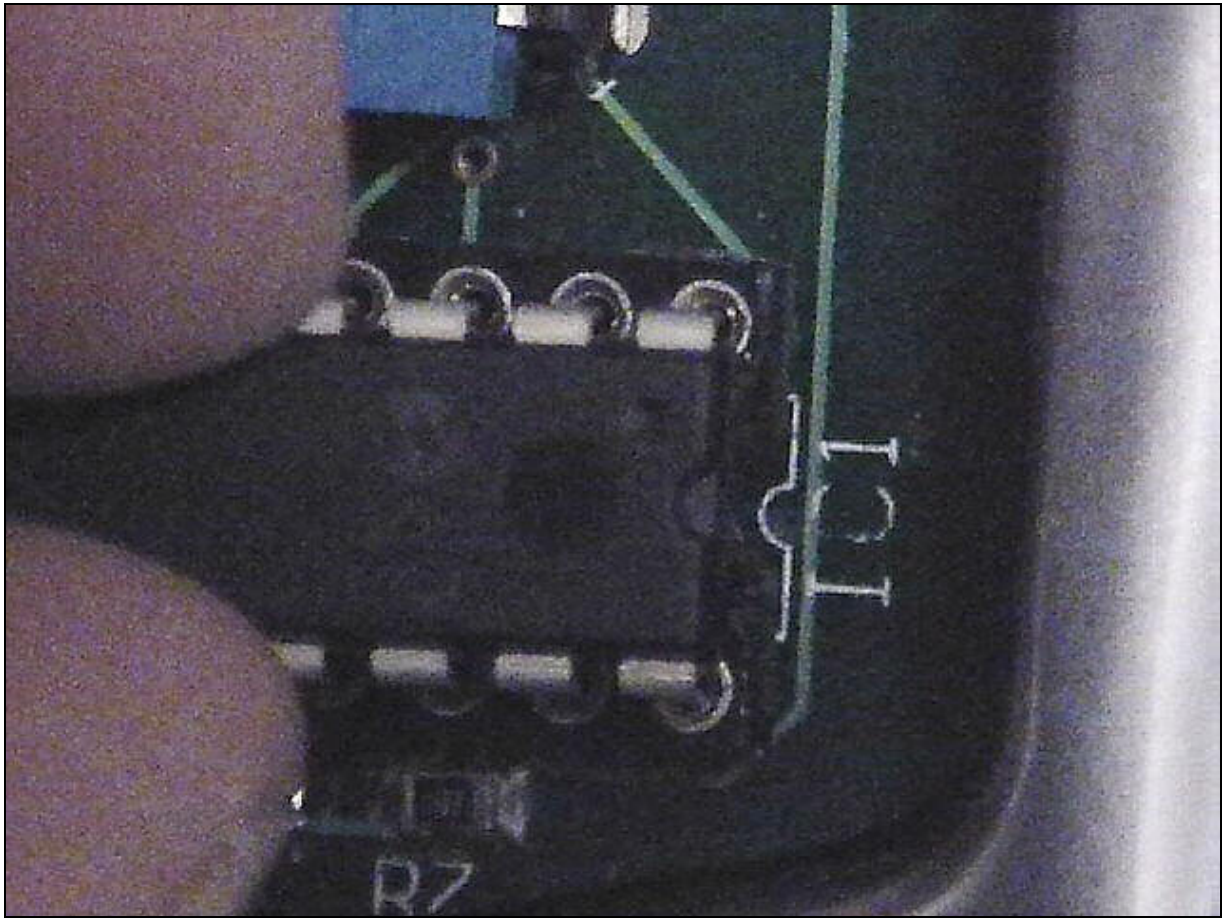


Figure 8 – Close up of notch orientation

## **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 (the top button located on the back of the grip frame) for ½ of a second, and release it. The LED will light up yellow and stay that way for several seconds after releasing the button. Tapping the trigger any time the LED is yellow will immediately make the marker active and ready to fire. After several seconds, the LED will then turn either green (normal mode) or red (competition mode) to indicate the tournament lock status.

### **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 eye button (the bottom button located on the back of the grip frame) for ½ second. The LED will blink yellow, 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 yellow (booting), followed by either solid green (normal mode) or solid red (competition mode). If the trigger is held in the back position while the power is turned on, the LED will light up solid green. If DIP Switch 2 is in the ON position (maintenance mode), the LED will light up solid blue.

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.

Pressing the EYE button while in trigger programming mode will increase the intensity of the LED while it is being pressed. This is helpful when making changes when there is bright light.

### **LED Colors and Meanings**

Due to the 'RGB' LED used with the DM4, the LED can be virtually any one of millions of different colors. The Equalizer uses the LED 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, monitors bolt).

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

Blinking Red: Battery is extremely low.

Red/Green toggle: There is an error with the anti-chop system.

Flickering green: object is in the breach.

Solid Blue: marker entering maintenance mode.

### **Tournament Lock**

It is possible to enable the tournament lock (COMPETITION mode) with the Equalizer. You can do this by setting DIP-switch 4 to the ON position. While this DIP-switch is in the ON position, it is not possible to access the trigger-programming mode.

### **Trigger Programming**

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

Make sure the marker is turned off. 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:

Red: Dwell programming mode.  
Green: Debounce™ programming mode.  
Yellow: Eye Mode programming mode.  
Blue: Ball In Place (BIP) Delay™ programming mode.  
Purple: Rate of Fire (ROF) cap programming mode.  
Teal: Eye Power programming mode.  
White: Firing Mode

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

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, yellow=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.

All settings start at 0 (i.e. 20 pulls for dwell is 20ms). 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 yellow 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, a yellow, a pause, and then 5 red flashes. The yellow flash is there to separate the full milliseconds from  $1/10^{\text{th}}$  of a millisecond (.1ms) intervals. The lowest allowable dwell time is 6.0ms and the longest allowable time is 50.0ms.

The default dwell is 20.0ms.



## **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 Eye Mode 2.

## **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 15 bps.

### ***Eye Power***

Pull and release the trigger once for the number of times you want the Eye Power to be. Each trigger pull represents a power increase. So, a setting of 6 would make the eye more powerful than a setting of 5.

The default Eye Power is 10.

### ***Firing Mode***

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

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

- 1 flash - Semi auto (NPPL legal)
- 2 flashes - 3 shot ramping (PSP legal)
- 3 flashes - 3 shot full auto (NXL legal)

If you pull and release the trigger more than 3 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 Firing Mode is 1 (semi-auto).

## ***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 a rainbow of colors 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, Eye Power, and Firing Mode 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.

## **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). Possible values are from 6.0ms to 50.0ms. The factory default is 20.0ms. Changes are made in .1ms units via the trigger.

Increasing your Dwell will increase the velocity of your marker only if the LPR is set too low (which will result in inconsistent chrono results). Due to the design of the DM4, an excessively long dwell will not increase the velocity (only make it more stable). 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 and efficiency 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. Possible values are from 1ms 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. Contrary to popular belief, a high Debounce time does not slow your marker down unless the time exceeds the total cycle time of the marker. This means that if your Debounce is 10ms, it is capped at 100bps, which is well beyond what the marker is capable of cycling.

## **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.

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 is the default eye mode.**

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 hopper feed rates. 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.

Possible values are from 10 bps to 30 bps. The factory default is 15 bps. Changes are made in 1 bps units.

### ***Eye Power***

The eye power controls how much power is used to drive the eye transmitter. Setting this value too low will cause problems if debris such as liquid paint gets into the breech. Setting this value too high will use more battery power. Changing this option is only necessary when using transparent types of paintballs with glow-in-the dark fill. Possible values are from 1 to 20. The factory default is 10. Changes are made in 1 unit increments. It is unlikely that you will ever need to change this setting.

### ***Firing Mode***

The Firing Mode determines how the marker will fire. Possible modes are semi-auto (one pull/release of the trigger fires the marker one time), 3 shot ramping (adheres to the 2005 PSP rules), and 3 shot full auto (adheres to the 2005 NXL rules).

The firing mode controls how the marker fires regardless of other settings. For example, if the Eye Mode is set to Eye Mode 2 (unlimited rate of fire), and the Firing Mode is set to 3 (full auto), then the marker will fire in full auto as fast as the hopper can feed.

If you changed the Eye Mode to Eye Mode 1 (capped), then the ROF Cap would determine the maximum rate of fire while in full auto.

**To setup your marker to be legal for PSP competition, set the Eye Mode to 1 (capped), the rate of fire cap (ROF Cap) to 15bps, and the Firing Mode to 2.**

### ***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.

### **Maintenance Mode**

If you set DIP Switch 2 to the ON position, the marker will be in 'maintenance mode' when you turn it on.

This mode allows you to determine if you have any leaks in your bolt assembly.

The DM4 is a very unique marker design. When the bolt is fully in the back or the front position, it should never leak or otherwise transfer air through the bolt. The only time air is transferred to the bolt assembly (to expel a ball) is while the bolt is in the forward motion, moving from the back to the front position.

While in maintenance mode, when you pull the trigger the solenoid will stay engaged for as long as the trigger is held, causing the bolt to move and stay locked forward until you release the trigger. This is a great way to determine if you have an o-ring problem on the forward stroke of the bolt. Without this capability, you would never be able to diagnose a problem with some of the o-rings. **Never hold the trigger for more than just a few seconds, as this could possibly cause the solenoid coil to overheat and become damaged.**

## **Equalizer Features**

The Equalizer always monitors the breech, looking for a ball to enter. When a ball has entered the breech, the LED will change from a blinking green to a flickering green. Due to the height of the eyes in the breech, a delay period is necessary to make sure the ball is fully in the breech before the marker is fired. This delay period is unknown as the BIP Delay™ and can be fine tuned to allow the highest possible rate of fire. Too short of a BIP Delay™ will result in chopping. The default setting works with any type of hopper, including non-agitated types.

The Equalizer upgrade chip consumes only a few milliamps of current when on. This is good news for DM4 owners as battery life has been a problem. When the battery gets low, the eyes will still work. You should expect about 100,000 shots out of a good quality 9-volt battery. If you forget to turn off your marker, it will automatically shut off after 30 minutes of inactivity.