

proto™
MATRIX



Proto Paintball

USA 10637 Scripps Summit Ct. San Diego, CA 92131
P 858-536-5183 F 858-536-5191

EUROPE Unit 1, ZK Park, 23 Commerce Way
Croydon, Surrey CRO 4ZS United Kingdom
P +44 (0) 20-8649-6330 F +44 (0) 20-8649-6339

ASIA 3F-2, No. 287, Jung Jeng Rd., Lujun Hsiang
Taoyuan 338, Taiwan (R.O.C.)
P +886-3-312-6540 F +886-3-311-8723

www.protopaintball.com

www.dyematrix.com

Copyright ©2006 DYE Precision, Inc. The stylized "proto" logo and the "P" logo are either registered trademarks, trademarks, or design trademarks of DYE Precision, Inc.
Dye Precision, Inc. U.S. Patent # 5,613,483 and additional patents pending.



WWW.PROTOPAINTBALL.COM

TABLE OF CONTENTS



INCLUDED WITH YOUR MATRIX

- MATRIX Marker
- Allen tool set including 1/16", 5/64", 3/32", 1/8", 5/32", 3/16" and 1/4"
- 1 oz. Dye Slick Lube™
- Parts Kit
- Barrel Sock
- Owner's Manual
- Warrant Card

ADDITIONAL RECOMMENDED TOOLS

- 3/8" Allen wrench
- 5/16" Allen wrench
- Canned Air

QUICK REFERENCE	PAGE 02
IMPORTANT SAFETY INSTRUCTIONS AND GUIDELINES	PAGE 03
BOARD SETTINGS AND FUNCTIONS	PAGE 04
FUSE BOLT	PAGE 08
LOW PRESSURE REGULATOR (LPR)	PAGE 10
HYPER2™	PAGE 12
ANTI CHOP EYES/ BALL DETENTS	PAGE 13
TRIGGER ADJUSTMENT	PAGE 14
ON/OFF AIRPORT	PAGE 14
EXPLODED VIEW	PAGE 15
TROUBLE SHOOTING GUIDE	PAGE 16
WARRANTY INFORMATION	PAGE 17

QUICK REFERENCE - USING YOUR MARKER

Air Supply - The MATRIX should be operated using air/nitrogen gas only. This air needs to be supplied to the Hyper2™ in-line regulator at a regulated pressure of no more than 850 psi. The Hyper2™ in-line regulator comes factory preset at 185psi.

Gassing Up Your MATRIX - Screw in your air system to the on/off airport and turn the knob of the airport clockwise, all the way in.

Turning On Your MATRIX - The MATRIX's power is controlled by two buttons. The top button turns the marker on and off, while the bottom button turns the eye on and off. Hold the power button for 3 seconds to turn the marker on. The LED in the grip will illuminate during the boot sequence.

NOTE: If the eye is not working properly, try replacing the battery.

Orange	- Boot sequence
Red	- Breech is clear, no ball (eye on)
Green	- Ball in breech, ready to fire (eye on)
Blinking Orange	- Indicates a low battery, battery should be changed as soon as possible
Blinking Red	- Eye is off
Blinking Green	- Eye failure (see MATRIX Board, page 4)

LPR - The LPR is pre-set from the factory at approximately 75-80 psi and should need no adjustment out of the box. If fine tuning adjustment is desired or needed, you must be sure that you are adjusting the LPR correctly. See page 10 for detailed instructions. If the LPR is improperly adjusted, you could dramatically hinder the MATRIX's performance or prevent the marker from functioning at all.

NOTE: Turning the adjustment screw clockwise, or in, will lower the LPR's output pressure. Turning the adjustment screw counterclockwise, or out, will raise the LPR's output pressure.

Hopper - To get the best performance out of your MATRIX, it is recommended that you use a motorized loader. Preferably one that force feeds the paint really, really fast!

Adjusting Velocity - The velocity is adjusted through the Hyper2™ in-line regulator. The Hyper2™ in-line is preset from the factory at approximately 230 psi. This pressure setting should have the marker shooting at about 285fps. Your paint-to-barrel fit will also have a noticeable affect on your velocity. Make sure that the paintball fits into the barrel loosely but does not drop through.

NOTE: For the Hyper2™, turning the adjustment screw clockwise, or in, will lower the output pressure, decreasing the velocity. Turning the adjustment screw counterclockwise, or out, will raise the output pressure, increasing the velocity.

NOTE: If the battery is too low, it may not be able to power the solenoid correctly. This will affect your MATRIX's velocity, causing it to become inconsistent and/or low.



WARNING

IMPORTANT SAFETY INSTRUCTIONS AND GUIDELINES

- The MATRIX marker is not a toy. Misuse may cause serious injury or death.
- Please read, understand and follow the directions in the MATRIX owner's manual.
- Eye protection that is designed specifically for paintball and meets ASTM/CE standards must be worn by user and persons within range.
- Recommend 18 years or older to purchase. Person under 18 must have adult supervision.
- Always treat the MATRIX marker as if it were loaded and able to fire.
- Only use compressed air or nitrogen gas in the MATRIX marker. DO NOT USE CO₂.
- Do not exceed 850 psi input pressure.
- Ensure all air lines and fittings are tightened and secured before gassing up the MATRIX.
- Always chronograph the MATRIX marker before playing paintball.
- Never shoot the MATRIX marker at velocities in excess of 300 feet per second, or at velocities greater than local or national laws allow.
- Never look into the barrel or breech area of the MATRIX when the marker is switched on and able to fire.
- Always fit a barrel blocking device to your MATRIX when not in use on the field of play.
- The owner's manual should always accompany the product for reference or in the event of resale and new ownership.
- Do not point the MATRIX marker at anything that you do not intend to shoot.
- Do not shoot at people, animals, houses, cars or anything not related to the sport of paintball.
- Do not fire the MATRIX without the Fuse bolt screwed in completely.
- If you read these instructions and do not fully understand them or are unsure of your ability to make necessary adjustments properly, call DYE or your local pro shop for help.



Figure 1

TURNING THE MATRIX ON AND OFF

To turn on the MATRIX, press and hold the upper button (see figure 1) until the LED light turns orange. The orange light indicates board bootup. After the bootup sequence, the LED will turn either RED (no ball) or GREEN (ball ready to fire). To turn the MATRIX off, press and hold the power button until the LED turns off.

NOTE: The MATRIX automatically switches off after 10 minutes of non-use.

FIRING THE MATRIX

As soon as the marker is turned on and the LED turns from orange to either red or green, the MATRIX is ready to fire. If there is no ball and the LED is RED, you need to hold the trigger for 1 second to force the MATRIX to fire once. If there is a paintball inside the breech and the LED is green, just press the trigger to fire the marker.

LED LIGHT INDICATOR

There is a LED light mounted on the back strap of the frame, under the two buttons. This light provides information to the user by the MATRIX. There are three colors on the LED light: red, green and orange.

When you turn on the marker in normal operation mode with the power button, the light colors mean the following:

Orange	Bootup sequence.
Red	No ball detected inside the MATRIX (eye on).
Green	Ball detected inside the MATRIX (eye on).
Blinking Red	Eye function turned off. The MATRIX will fire even though there is no ball inside the breech.
Blinking Green	Eye blocked. This means that your eyes are either dirty or there is a bad connection. The ROF (rate of fire) is automatically reduced to prevent chopping. If this happens during game play, you can turn the eye off to increase your ROF.
Blinking Orange	Indicates a low battery. Battery should be changed as soon as possible.



ORANGE



RED



GREEN

NOTE: The eye is always activated when you turn the marker on.

BOARD SETTINGS AND CONFIGURATION MODE

There are four settings you can alter on the MATRIX board with the DIP switches inside the grip frame (see figure 2):

ABS	Anti Bolt Stick.
Trigger Sensitivity	This setting adjusts the delay between two trigger pulls. This is the time the solenoid is activated for.
Dwell	Rate Of Fire when the eye is deactivated.
ROF	

Anti Bolt Stick - When ABS is activated, the dwell is increased after 15 seconds of non-use for the next shot fired. This helps to prevent bolt-stick, but may result in higher velocity for the first shot.



ABS on (default)



ABS off



Figure 2

WARNING

When servicing your marker:

- Make sure a barrel sock is fitted to the MATRIX.
- Make sure your hopper is removed from the MATRIX.
- Make sure there are no paintballs in the breech of the MATRIX.
- Always remove the first stage regulator and relieve all residual gas pressure from the MATRIX before disassembly.
- The MATRIX can hold a small residual charge of gas, typically 1 shot, with the first stage regulator removed. Always discharge the marker in a safe direction to relieve this residual gas pressure.

WARNING

- The MATRIX is not water resistant. Excess moisture can cause damage to electronic parts.
- Keep the board and all electrical components clean of dirt, paint and moisture.
- To clean the board, use canned air. If a more aggressive cleaning method is needed, lightly scrub the components with a soft, dry brush. Heavy scrubbing will damage the board.



MATRIX BOARD - SETTINGS AND FUNCTIONS (CONTINUED)

Configuration Mode - The following settings can only be modified in configuration mode. To activate the configuration mode, turn your marker off and set DIP switch 2 to the on position. Next, turn your marker on. The 3-color LED cycles through all colors for one second to indicate that you have entered the configuration mode. To cycle through different settings, pull and release the trigger. Configuration mode has 3 settings that can be changed.



Normal Mode



Configuration Mode

Green - Trigger Sensitivity

Values 1 - 20 (factory default 5)

Trigger sensitivity is the amount of time that the trigger has to be released before the next trigger pull is allowed. In some situations with too low of a value, the marker may begin to shoot full-auto.

Red - Dwell

Values 5 - 30 (factory default 18)

Dwell is the amount of time that the solenoid will be activated. Follow these steps for the best way to set your dwell:

- Remove loader and any paintballs from the MATRIX marker.
- With the dwell set at 12, start increasing the value until the marker begins to fire.
- When you reach the setting where the marker begins to fire, get some paint and a loader and go to a chronograph.
- Increase the dwell until you see no increase in the velocity. This is the optimal dwell setting to be used.

Orange - Rate Of Fire (ROF)

[When Anti Chop Eye (ACE) is deactivated]

Values 5 - 24 (factory default 24bps)

The ROF is unlimited by software when the eye is on. The only limiting factor is the loader feed rate. The marker pneumatic cycle rate is far faster than any loader on the market. You should set this setting to the constant feed rate of your loader. Setting this higher than your loader is capable of feeding risks chopping a ball.

TO CHANGE THE VALUE OF A SETTING:

While in configuration mode, pull the trigger and hold it for more than one second. The LED will flash to indicate the previous setting. After that, you can set the new value with the trigger. For example, if you want to change the trigger sensitivity to 7 units:

- 1 Cycle through menus by pulling and releasing the trigger until the LED light is GREEN (trigger sensitivity).
- 2 Pull and hold the trigger until the LED starts to flash (factory default for trigger sensitivity setting is 5 units, so the LED will flash 5 times).
- 3 When the LED stops flashing, pull and release the trigger seven times in a fast pace. The new value is set after you haven't touched the trigger for one second. The LED will cycle through all colors to indicate that the new value is saved. All other configurations are changed the same way. Just as in part 2 above, change the mode to RED for "dwell" or ORANGE for "ROF when ACE is deactivated" to change the desired configurations.
- 4 To exit configuration mode, set DIP 2 to the off position.

NOTE: You cannot turn your marker off with the power button when the marker is in configuration mode. You must first set DIP switch 2 to the off position.

NOTE: When you set the values, remember that only trigger sensitivity starts from 1. The "dwell" and "rate of fire" start from 5. Therefore, to set the dwell at 20, you need to pull the trigger fifteen times, because the first trigger pull will start at 5.

6

MATRIX BOARD - SETTINGS AND FUNCTIONS (CONTINUED)

CHECKING CONFIGURATIONS

You can check your DIP switch configuration by pulling and holding the trigger when you turn the marker on. Hold the trigger until the LED starts flashing. Orange indicates the anti bolt stick (ABS) setting (1 flash = off and 2 flashes = on). For example, if your ABS is ON then the LED will flash orange twice.

BATTERY

The 9V battery will last for about 40,000 shots. Please be aware that there are substantial differences in performance between different brands of batteries. Use of high quality alkaline or lithium ion batteries is recommended for maximum battery life. If you plan not to use your marker for a long period of time (a month), it is recommended that you remove the battery from the marker. When the battery voltage starts to go too low, you will notice your velocity starts to decrease and the board can turn off. For tournament use, it is recommended to change the battery for each tournament. When changing your battery, take special care to ensure the wiring harness is not pinched under the battery (see figure 1).

CHANGING THE BATTERY

The battery is housed on the left side of the grip frame. To access the battery, remove the three screws holding the left side grip panel down. Use a 3/32" Allen wrench. Carefully lift the battery out of the frame, taking care not to damage the battery lead wires.

When inserting a new battery, make sure the solenoid and eye wires are pushed into the wire passage at the rear of the frame. This will ensure that the wires are not pinched or cut.

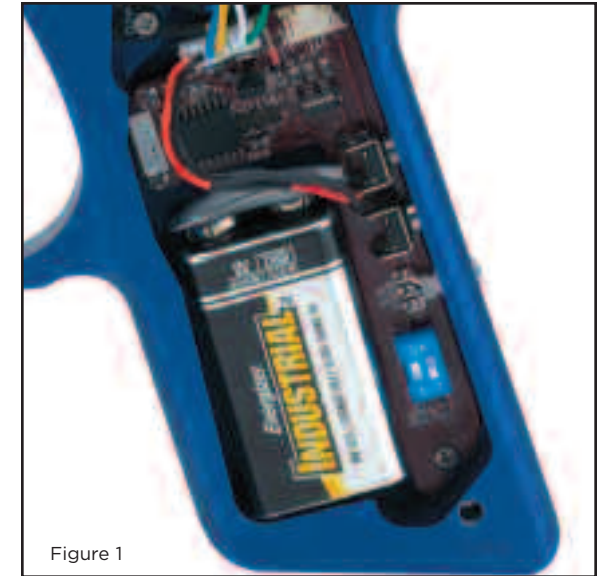


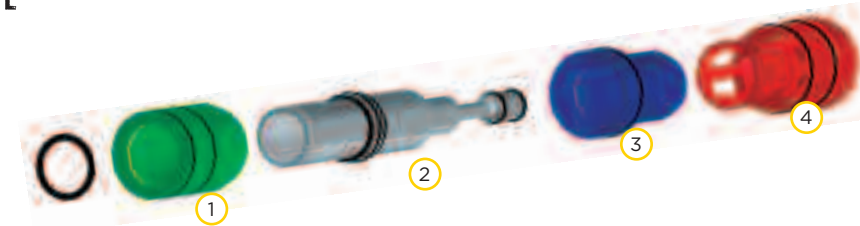
Figure 1



- A low battery will not be able to power both the ACE eye and the trigger switch, causing ACE eye failure.
- If the battery is low, it may not be able to power the solenoid correctly. This will affect the MATRIX's velocity, causing it to become inconsistent and/or low.
- An intermittent blinking orange light indicates a low battery. A low battery can cause malfunctions to the marker. In this case the battery should be changed as soon as possible.

7

NOTE: IF THE MARKER WILL NOT FUNCTION WITH THE EYE ON, THERE IS A GOOD CHANCE THE BATTERY NEEDS TO BE CHANGED.



FUSE™ BOLT OPERATION

To achieve top performance from your MATRIX, it is important to understand the basic operation of the MATRIX's patented FUSE™ bolt system.

This design consists of three sleeves threaded together to capture the only moving part of the system, the bolt.

The FUSE™ Bolt has four components

- 1 Cylinder
- 2 Bolt
- 3 Top Hat
- 4 Rear Cap



FORWARD POSITION

Air is supplied to the bolt at two points. A high-pressure supply of air is routed to the back of the bolt into the supply chamber. This air source is responsible for propelling the ball. Low-pressure air is supplied from the LPR to the solenoid. From the solenoid, the air is routed through two small holes to the section of the bolt referred to as the cylinder.



BACK POSITION

When the MATRIX is aired up, air is transferred by the solenoid to the front of the cylinder. This air pushes against the bolt sail and the bolt is held in the back position. When the bolt is held back, the O13 o-ring in the top hat seals around the bolt and contains the air in the supply chamber.

When the marker is fired, the microswitch is pressed, telling the solenoid to switch the flow of air from the front of the cylinder to the rear of the cylinder. Air that enters the rear of the cylinder will push on the bolt sail, moving the bolt forward. The air in the front of the cylinder is vented.

As the bolt moves forward, the tapered stem passes through the top hat. Once the bolt stem can no longer seal against the O13 o-ring, the air contained in the supply chamber is released. The air passes through the venturi ports in the bolt and out the front of the bolt to propel the ball. When the bolt is in the forward position, the inside bolt stem o-ring prevents the flow of air from continuously flowing through the marker when the bolt is forward. This helps the marker shoot much more efficiently.

NOTE: LOW OR ERRATIC VELOCITY MAY BE DUE TO A LOW BATTERY NOT SUPPLYING AMPL E ELECTRICAL CURRENT TO THE SOLENOID. IN THIS CASE, CHANGE THE BATTERY.

BOLT MAINTENANCE

Regular MATRIX Fuse™ bolt maintenance is vital to the performance of the MATRIX. If the Fuse™ bolt is not kept well-greased and the o-rings in good shape, the performance of the MATRIX will be greatly hindered.

To remove the bolt, you will need a 1/4" Allen wrench. Unscrew the bolt from the rear of the marker. It only takes one and one half revolutions to unscrew the bolt so that it can be pulled out. After the bolt has been cleaned and greased and is ready to be inserted into the body, be sure all bolt sleeve components are screwed together snugly. Slowly push the bolt into the body. Take care not to cut or nick the o-rings as they pass the threads.

GREASE THE MATRIX FUSE™ BOLT EVERY 10-15 THOUSAND SHOTS.

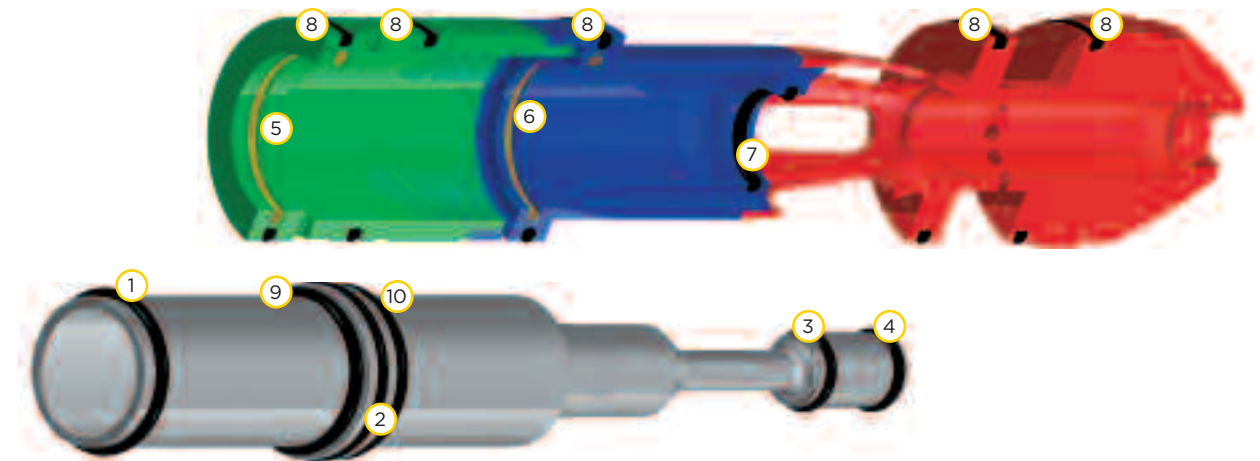
BEFORE INSTALLING THE BOLT INTO THE MARKER, BE SURE ALL BOLT SLEEVE COMPONENTS ARE SCREWED TOGETHER SNUGLY.

If you do not grease the bolt, you will run the risk of damaging o-rings. This will create excessive friction and drag on the bolt, ultimately resulting in breaking the bolt. When greasing the MATRIX Fuse™ bolt, pay special attention to all o-rings that are on the bolt and that ride on a surface of the bolt. The first seven o-rings listed below should be generously greased during maintenance.

FUSE™ BOLT O-RING LIST

- | | |
|----------------------------------|---------------------------|
| 1 Bolt tip (014 BN70) | 6 Top hat (017 UR70) |
| 2 Bolt sail (015 BN70) | 7 Top hat (013) |
| 3 Inside bolt stem (009 BN70) | 8 Outer sleeve (020 BN70) |
| 4 Rear bolt stem (009 BN70) | 9 Front bumper (015 BN70) |
| 5 Front wall internal (017 UR70) | 10 Rear bumper (111 BN70) |

NOTE: All remaining o-rings should have a thin coating of grease as well.



LPR [LOW PRESSURE REGULATOR] - ADJUSTMENTS AND MAINTENANCE



Figure 1

LPR ASSEMBLY, CLEANING, TESTING AND CHANGING SEALS

The Low-Pressure Regulator (LPR) is located in the lower front of the MATRIX (see figure 1). The function of the LPR is to lower the air pressure supplied to the marker by the in-line, before it reaches the solenoid. This pressure is used to move the bolt forward and back. The factory setting is 75 PSI. You can fine tune your MATRIX to its minimum cycle pressure. This will reduce the amount of force of the bolt hitting the ball (reducing ball breaks) and help with efficiency. Too low of pressure will cause the bolt to not cycle, move sluggishly or not at all. If you experience dramatic shoot down during rapid fire, the LPR may be adjusted too low. Too high of pressure will cause the marker not to shoot as smoothly, potentially increase ball breakage and cause undue wear and fatigue on the bolt components.

It is important to keep the seat and piston face clean of all dirt and debris. Clean the seat and piston face and grease the retainer o-ring every six months or 60,000 shots.

The LPR has five components and six seals

- | | |
|----------------------------------|---|
| 1 Piston large o-ring (012 BN70) | 6 Piston small o-ring (006 UR90) |
| 2 Piston | 7 Main seal (mounted in the seal retainer) |
| 3 Piston spring | 8 Seal retainer o-ring (010 BN70) |
| 4 Body | 9 Seal retainer (functions as an adjustment screw also) |
| 5 Body o-rings (3pcs, 012 BN70) | |

The only user-serviceable part in the LPR is the seal retainer. This seal needs to be changed in the unlikely case the LPR is creeping up.

! WARNING

When servicing your marker:

- Make sure your hopper is removed from the MATRIX.
- Make sure there are no paintballs in the breech of the MATRIX.
- Always remove the air supply and relieve all gas pressure in the MATRIX before disassembly.
- It is not recommended for the user to remove the LPR from the body and disassemble it.

LPR [LOW PRESSURE REGULATOR] - ADJUSTMENTS AND MAINTENANCE

CHANGING THE SEAL RETAINER

- 1 Screw out LPR cap in front of the marker using a 1/4" Allen wrench.
- 2 Screw out LPR seal assembly (brass) using a 3/16" Allen wrench.
- 3 Screw in new LPR seal assembly.
- 4 Screw LPR cap in place securely.

If the user needs to replace the whole LPR assembly, follow these instructions (refer to figure 2):

- 1 Take frame off the marker.
- 2 Screw out LPR set screw using a 5/64" Allen wrench.
- 3 Screw out LPR cap using a 1/4" Allen wrench.
- 4 Pull out the LPR by screwing a rod with a 10/32 thread into the seal retainer (brass piece) inside the LPR and pulling it out.
- 5 Put everything back in reverse order. Be sure to grease the #012 o-rings, so as to prevent cutting them upon installation.
- 6 Tighten LPR cap securely.

The LPR pressure can be set quite accurately even without an LPR test tool. Screwing the adjustment screw (seal retainer) all the way in will set the LPR pressure to approximately 25 psi. Now turning out the adjusting screw 180 degrees will increase the pressure by approximately 5 psi. For example, turning the screw 5 complete turns out will set the pressure to approximately 75 psi. Use a 3/16" Allen wrench to make all adjustments to the LPR. Turning the adjustment screw clockwise, or in, will lower the LPR's output pressure. Turning the adjustment screw counterclockwise, or out, will raise the LPR's output pressure.

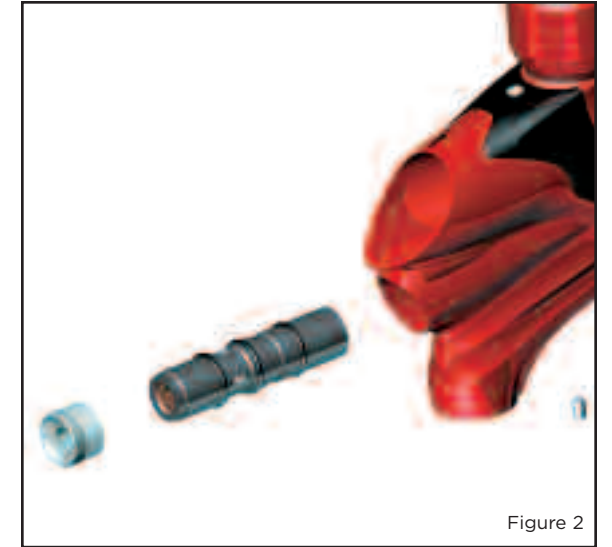
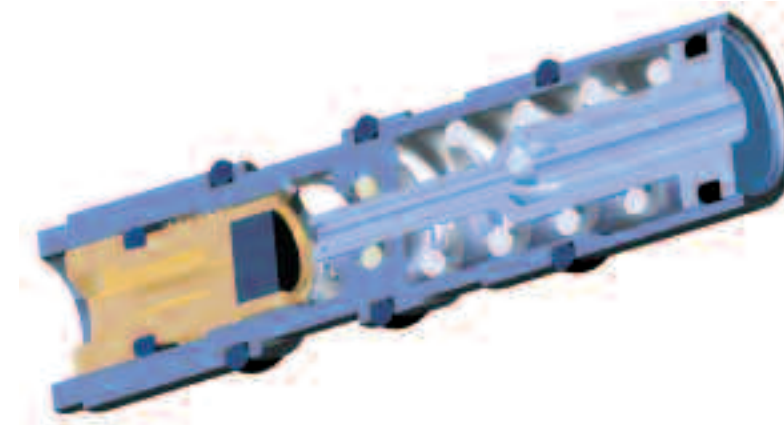


Figure 2

! WARNING

When servicing your marker:

- Make sure your hopper is removed from the MATRIX.
- Make sure there are no paintballs in the breech of the MATRIX.
- Always remove the air supply and relieve all gas pressure in the MATRIX before disassembly.
- It is not recommended for the user to remove the LPR from the body and disassemble it.



HYPER2™ IN-LINE REGULATOR - ADJUSTMENTS AND MAINTENANCE

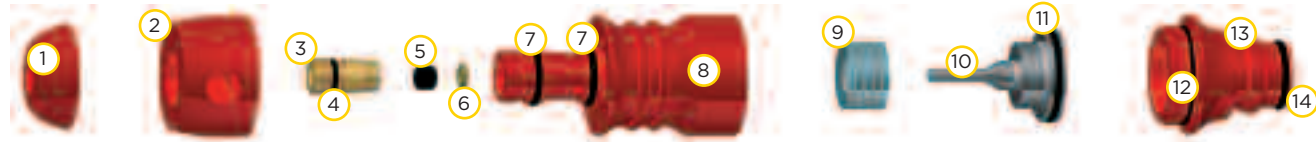


Figure 1

USAGE

Carefully connect your air hose from your bottle or air system to the Hyper2™ In-Line. The Hyper2™ In-Line is set by the factory to approximately 185psi. This pressure should give you a velocity of approximately 285fps.

ADJUSTMENTS

The output pressure of the Hyper2™ In-Line is adjusted by turning the brass seat housing. The seat housing screw is located up inside the bottom of the reg. A 3/16" Allen wrench will be needed for this operation. By turning the housing counterclockwise, you will increase the output pressure of the regulator to the marker. By turning the housing clockwise, you will decrease the output pressure of the regulator.

After each adjustment of the output pressure of the Hyper2™ In-Line, you will need to cycle your marker a few times. This will allow your marker and air system to stabilize at their new operating pressure. The Hyper2™ will need a break-in period of about 2,500 shots to let its seat form to the piston and reach its optimum performance.

The Hyper2™ has eight components and six o-rings

- | | | |
|------------------------------|----------------------------------|-----------------------------------|
| 1 Retaining cap | 6 Piston small o-ring (007 UR90) | 11 Piston large o-ring (018 BN70) |
| 2 Swivel | 7 Swivel o-rings (013 BN70) | 12 Reg cap o-ring (020 BN70) |
| 3 Seat housing | 8 Reg body | 13 Reg cap |
| 4 Retainer o-ring (010 BN70) | 9 Shim stack | 14 ASA o-ring (015 BN70) |
| 5 Reg seat | 10 Piston | |

Disassembly of the Hyper2™ In-Line is easily done with 3/8" and 5/16" Allen wrenches.

MAINTENANCE

To ensure top performance from the Hyper2™, maintenance should be performed every six months or sooner, depending on the severity of playing conditions. Cold, wet weather will shorten the effective life of the grease. Heavy dust or fine sand can infiltrate the Hyper2™ and prevent the piston from moving smoothly and/or cut the o-rings.

- 1 Make sure the inlet and outlet ports and connecting fittings are free of all dirt and paint.
- 2 Examine all o-rings for nicks or cuts.
- 3 Carefully inspect the seat for excessive wear that might cause spiking and over-pressurizing.
- 4 Clean any accumulated dirt out of the air chambers and passages.
- 5 Keep the piston o-rings and spring pack generously greased to allow smooth velocity adjustment and prevent erratic velocity spikes and drop off.
- 6 Clean off all old grease that may be contaminated with dirt; reapply fresh grease to the piston and other necessary areas.
- 7 Be sure to reassemble the internal components and shim stack (see figure 2) in the proper order and direction.
- 8 See diagram for assistance.

Shim Stack



Figure 2

ANTI CHOP EYES/ BALL DETENTS - MAINTENANCE AND CHANGING

ANTI CHOP EYES

The Anti Chop Eye (ACE) system will prevent the MATRIX from chopping paint by not allowing the marker to fire until a ball is fully seated in front of the bolt. The eyes use a beam across the breech. On one side there is a transmitter, and on the opposite side a receiver. In order for the marker to fire with the eyes turned on, the signal between the two eyes must be broken. After every shot, before the next ball drops in the breech, the eye transmitter and receiver must see each other. If the eyes are dirty and cannot see each other between shots, the LED on the board will start blinking green. This means that the eyes are dirty. This is an extremely reliable system as long as the eyes are kept clean. The most common reason for dirty eyes is broken paint. If the eyes become dirty the marker will default to a reduced rate of fire to prevent chopping. If this happens during game play, you can bypass this by turning the eyes off. Clean the eyes as soon as possible.

NOTE: IF THE BATTERY IS LOW, THE MARKER MAY ACT AS IF THE EYES ARE DIRTY OR NOT FIRE AT ALL. IN THIS CASE, REPLACE THE BATTERY.



Figure 3

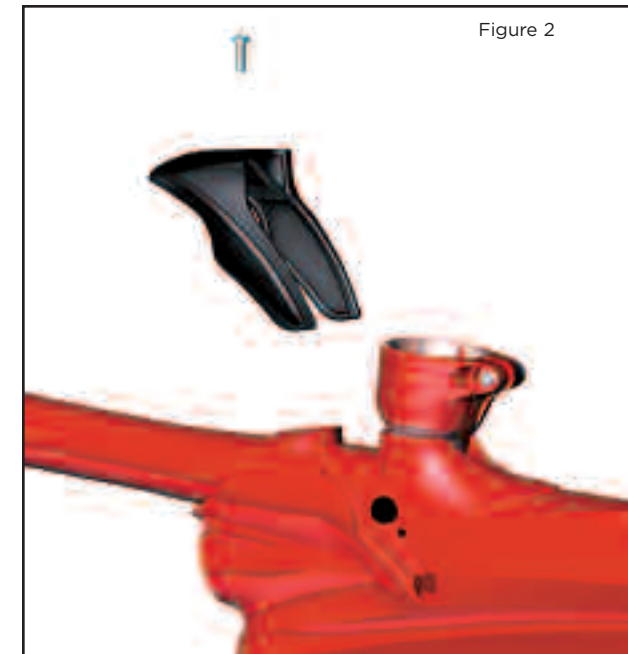


Figure 2

CLEANING THE ANTI CHOP EYES

Quite often, just cleaning the breech out with a swab will clean the eyes well enough for them to read one another. For a thorough cleaning, the best method is to use air. Using an air hose or canned air (typically used for dusting keyboards) works best.

Blow the eyes clean from inside the breech. If you feel the eyes still need a more detailed cleaning, remove the eye cover to gain full access to the eyes.

To remove the eye cover, you will need a 1/16" Allen wrench.

NOTE: Regular eye cleaning is recommended even if no paint is broken. Clean the eyes every two months or 10,000 shots to eliminate any built up dirt. Excess grease from the front bolt o-ring can build up in front of the eyes. Remember to check for this after greasing the bolt and cycling the marker a few times.

CHANGING BALL DETENTS

The ball detents are also located under the eye cover. If you are experiencing double feeding or chopping, check the condition of the ball detents. They should come to a soft point. If they are flat or heavily rounded, they should be replaced. Ball detents should be replaced about every 40,000 shots.

NOTE: TAKE CARE WHEN REPLACING THE EYE COVER. OVERTIGHTENING THE RETAINING SCREW COULD RESULT IN STRIPPING THE THREADS.

TRIGGER ADJUSTMENT AND ON/OFF AIRPORT



Figure 1

WARNING

- Be sure the trigger is not adjusted to the point where it is too sensitive and may cause accidental discharge of the marker.
- Removing the trigger spring will cause premature wear on the microswitch, resulting in failure.
- **Be sure you do not pinch the wires between the frame and body when reattaching the frame to the body.**

ADJUSTING YOUR TRIGGER

The trigger's forward travel and over travel are fully adjustable so that the user can fine-tune the trigger to his or her exact liking.

- Remove the grip frame from the body of the MATRIX.
- As you pull the frame away from the body, take care so as not to damage the wires running between the two parts. Be careful not to lose the trigger spring.
- The two adjustment screws are located at the top of the trigger in the grip frame (see figure 1).
- Use a 5/64" Allen wrench to make the desired adjustments.
- The screw toward the front of the trigger controls the forward travel. Screwing it in will shorten the trigger's length of pull.
Note: If this screw is adjusted too far, the switch will be held down at all times and the marker will not fire.
- The screw toward the rear of the trigger controls the over travel. By turning this screw you can adjust how far the trigger will travel after it reaches the firing point.
Note: If this screw is adjusted too far, the trigger will not be allowed to travel far enough to depress the switch and fire the marker.
- When the desired trigger pull has been achieved, reattach the frame to the body.
- Take care that the spring is seated properly. Using the trigger without a spring is not recommended and will cause the microswitch to fail much sooner than when a spring is used.
- Be sure that all wires are laid properly in their appropriate cavities.

NOTE: Be sure that the frame and trigger assembly are kept clean. If there is excess dirt or paint build up around the trigger, the trigger will no longer move freely. In addition, paint and dirt can cause the microswitch to not function properly or fail.

ON/OFF AIRPORT

The MATRIX comes equipped with an On/Off Airport attached to the bottom of the frame. To turn on the gas supply, twist the on/off knob clockwise, all the way in. To turn off the gas supply, twist the on/off knob counterclockwise, all the way out. As you turn the knob out, the residual gas between the Hyper2™ and the on/off airport is vented.

REMOVING THE ON/OFF AIRPORT

- 1 Follow the instructions on page 7 to remove the battery from the frame.
- 2 Using a 3/32 allen key, turn the airport locking screw counterclockwise until the on/off airport is loosened.
- 3 Slide the on/off airport off of the frame.
- 4 To re-install the on/off airport, follow steps 1-3 in reverse order.

MATRIX EXPLODED VIEW



PARTS LIST

- | | |
|----|---------------------|
| 1 | Clamping Feed Neck |
| 2 | Ball Detent |
| 3 | Eye Cover |
| 4 | Hyper2™ |
| 5 | "ACE" Eye |
| 6 | Solenoid |
| 7 | Front Frame Screw |
| 8 | 45 Frame |
| 9 | Rear Frame Screw |
| 10 | LPR Retaining Screw |
| 11 | LPR |
| 12 | LPR Cap |
| 13 | Fuse Bolt |
| 14 | MATRIX Body |
| 15 | Eye Cover Screw |
| 16 | On/Off Airport |

TROUBLE SHOOTING GUIDE

MATRIX TROUBLE SHOOTING

KEY : **O-RING SIZE** **O-RING HARDNESS** **PART NUMBER CORRESPONDING TO THE DIAGRAM**
#000 UR70 (#)

AIR LEAK BETWEEN THE FRAME AND BODY

- First remove the frame and try to pinpoint the source of the leak:
- If it comes from the small hole under the LPR, you need to remove your LPR. The cause of the leak is one of the three **#012 BN70 (5)** o-rings on the outside of the LPR or the **#006 UR90 (6)** o-ring found inside the LPR (see page 10).
- If it comes from somewhere around the solenoid, there are three likely causes:
 1. **#015 BN70 (5)** on the bolt sail (page 9)
 2. **#020 BN70 (8)** on the cylinder [the one on the middle of the cylinder] (page 9)
 3. Seat under the solenoid
 4. If it leaks from any of the set screws under the body, re-loctite the screws with red loctite.

AIR LEAK FROM THE LPR CAP (REFER TO PAGE 10)

- Remove the LPR and change the forward-most **#012 BN70 (5)** o-ring on the LPR body. If that does not help, change the seal retainer **(7)** inside the LPR body. Refer to page 10 of the manual for disassembly instructions.

INCONSISTENT VELOCITY OVER THE CHRONO

- In-line regulator not giving consistent pressure: refer to the Hyper2™ section below, or if using an after-market regulator, refer to its manufacturer.
- Low battery: change the battery.
- Bad seals in the bolt: take out the bolt, clean it, lube it with Dye Slick Lube™. Replace any o-rings that seem damaged, swollen or in otherwise bad shape. Most likely the o-ring at fault is the **#017 UR70 (5)** front wall o-ring. Also check that the **#014 BN70 (1)** o-ring on the bolt tip is in place (see page 9).
- LPR pressure set incorrectly or LPR pressure fluctuating: if pressure is too low, the bolt will not cycle correctly. Try turning the LPR pressure a bit higher. If the pressure seems inconsistent, you can have an authorized Matrix center check the LPR pressure. List of tech centers can be found at www.protopaintball.com.
- Dwell set too low: if you set the dwell too low, the dump chamber will not empty completely and will cause erratic velocities. Refer to board settings on page 6 for information on setting the dwell.

TRIGGER BOUNCE

- Raise the trigger sensitivity value (see page 6).
- If you are having excessive trigger bounce when firing the gun, make sure you have an uncut spring behind the trigger. Adjust the trigger so that the firing point of the trigger pull is located about halfway through the travel of the pull.

AIR LEAK BETWEEN THE BODY AND REAR CAP

- Replace the **#020 BN70 (8)** o-ring on the bolt rear cap (see page 9).

MARKER WILL NOT FIRE

- A low battery may cause malfunctions to the marker. In this case, the battery should be changed as soon as possible.
- If the LED light is red, the marker will not fire because there is no ball in the breech. Hold the trigger for 1 second and the marker should fire. If it does not fire after holding the trigger, or if the LED light is green and it will not fire:
 - Make sure dwell setting is at the stock value of 18 (see page 6).
 - Make sure the trigger is adjusted properly and is actuating the microswitch (see page 14).
 - Make sure there are no broken solenoid wires.
 - Sticking bolt: pull out the bolt, check for swollen o-rings and re-grease o-rings.

MARKER SHOOTING SLOW WHEN EYE IS ON AND BLINKING GREEN

- The eyes are not working correctly. Clean the eyes with rubbing alcohol and a cotton swab. You'll know that they are clean if the LED turns red when there is nothing inside the breech of the MATRIX.
- Make sure the eye wires are not broken or pinched.
- The battery may be low. In this case, the battery should be changed as soon as possible.
- Make sure the eye ribbon cable is plugged in correctly with the metal tab facing up.

MARKER ISN'T WORKING THOUGH EYES ARE CLEAN AND ALL WIRES ARE CONNECTED; MARKER DOES WORK IF EYES ARE TURNED OFF

- Change the battery. The voltage in the battery is too low for the eye to function correctly.

AIR LEAK THROUGH THE BARREL (REFER TO PAGE 9)

- There are three possible o-rings that cause this leak:
 - If the leak comes through the inside of the bolt, replace the **#013 BN70 (7)** on the bolt top hat. If the cause is the **#013 BN70 (7)** o-ring, the input pressure to the gun is likely too high.
- If you hear a loud pop while firing the marker and air is rushing out from the front of the gun, it means:
 - The Hyper2™ is set too high causing the **#013 BN70 (7)** top hat o-ring to blow off, replace the o-ring.
 - The **#017 UR70 (5)** inside the bolt cylinder or **#020 BN70 (8)** outside the bolt cylinder is leaking, replace the o-ring.

AIR LEAK FROM THE BACK HOLE OF THE BOLT

- Take out the bolt, unscrew the back part of the bolt and change the **#009 BN70 (3,4)** o-ring on the back of the bolt shaft.

HYPER2™ TROUBLE SHOOTING (REFER TO PAGE 12)

NOTE: TO TAKE APART THE REGULATOR, USE A 5/16" ALLEN WRENCH ON THE BOTTOM AND A 3/8" ALLEN WRENCH ON THE TOP. TWIST COUNTERCLOCKWISE TO OPEN. DO NOT USE ANY OTHER METHOD.

NO OR POOR AIR FLOW

- Check for blocked air passage in hose line or regulator. Adjustment screw **(3)** may be screwed in too far.
- Seat **(5)** may have excessively deep piston groove cut into it. Replace if needed.

ERRATIC VELOCITY OR SHOOT DOWN

- Piston **(10)** or shim stack **(9)** may be binding due to excessive dirt or lack of lubricant.
- Seat **(5)** may be dirty or damaged. Clean and grease regulator. Inspect and replace damaged parts as needed.
- Make sure shim stack **(9)** is stacked properly (see page 12, figure 2).

OUTPUT PRESSURE CREEPS UP

- Dirty seat **(5)** or damaged piston face. Clean and inspect; if either is damaged, replace.
- Piston o-ring **#007 UR90 (6)** may be damaged.

AIR LEAK FROM SIDE VENT HOLE

- Piston o-rings **#007 UR90 (6)** and **#018 BN70 (11)** may be damaged. Inspect o-rings. Replace if any visible nicks or cuts are found.

AIR LEAK FROM BOTTOM OF ADJUSTMENT SCREW

- This is a safety bleed-off to help prevent over-pressurizing. De-gas the Hyper2™; be sure all air is vented out of the regulator. Supply air back to the regulator. The leak should stop. If the leak persists, replace the regulator seat **(5)**. Make sure there are no nicks or scratches on the raised ring at the bottom of the seat-retaining cavity.

MATRIX WARRANTY INFORMATION

WARRANTY

DYE Precision, Inc.

Warrants for one year to the initial retail purchaser, from the initial date of purchase, that the paintball marker and regulator are free from defects in materials and workmanship, subject to the requirements, disclaimers and limitations of this warranty. Disposable parts, normal maintenance and standard wear and tear parts such as batteries, o-rings and seals are not warrantied. The solenoid and electronic components on the marker are warrantied for six months. This warranty does not cover scratches, nicks, improper disassembly, improper re-assembly, misuse, neglect or improper storage. Modification to the product will void the warranty. The only authorized lubricant for the marker is Slick Lube™. Use of any other lubricant will void your warranty. This warranty is limited to repair or replacement of defective parts with the customer to pay shipping costs. Warranty card and proof of purchase must be submitted to Dye Precision for warranty to be in effect. This warranty is not transferable. This warranty does not cover performance. Paintball markers are non-refundable.

TECHNICAL SUPPORT

Our Technical Support Department is open Monday through Friday, from 9am to 5pm, PST, and can be reached at 858-536-5183. Additional support is available through our web site, www.protopaintball.com.

DISCLAIMER

The specifications & photographs in this material are for information and general guidance purposes only.

Our products are continually updated and changes may be made to specification, design or appearance from time to time. These are subject to change without notice. Contents of box may therefore vary from owner's manual. For details of changes in design, specification or appearance consult your local distributor or dealer.

The FUSE™ bolt and Slick Lube™ are registered trademarks. Design rights, copyrights and all other rights reserved. All patterns, drawings, photographs, instructions or manuals remain the intellectual property of the manufacturer.

Covered by U.S. Patent 5,613,483. Additional patents pending. All rights will be strictly enforced.

DYE Precision, Inc.

USA 10637 Scripps Summit Ct. San Diego, CA 92131
P 858-536-5183 F 858-536-5191

EUROPE Unit 1, ZK Park, 23 Commerce Way
Croydon, Surrey CRO 4ZS United Kingdom
P +44 (0) 20-8649-6330 F +44 (0) 20-8649-6339

ASIA 3F-2, No. 287, Jung Jeng Rd., Luju Hsiang
Taoyuan 338, Taiwan (R.O.C.)
P +886-3-312-6540 F +886-3-311-8723

16

W W W . P R O T O P A I N T B A L L . C O M

17

W W W . P R O T O P A I N T B A L L . C O M