Independence

By

Warning:

Paintball markers are dangerous pieces of sporting equipment. Like any air rifle or air pistol, it can cause injury or death.

By purchasing this paintball marker you assume all liability. Alien Paintball Equipment, INC. (Alien) assumes no liability for its use, misuse, injury or death. Please follow all federal, state and local ordinances.

Remember it is the "unloaded" gun that hurts people.

Independence retains air even after the bottle has been removed. It can retain a charge for hours or even days after the bottle has been removed. Before removing protective eyewear always check and double check that there are no balls in the chamber and that the marker has no air pressure.

Risk of injury, especially blindness, can be greatly reduced by proper use and handling. It is of the utmost importance that user and everyone within 300 feet of the marker have proper paintball goggles on at all times. Some "finned" paintballs can increase this distance to over 500 feet.

Always have a safety plug in, or a safety sock on, between uses. Always put on a paintball-approved safety goggles before uncovering barrel. Always cover the barrel before removing safety goggles.

Eyes are not a safety feature! Eyes limit ball breakage. The gun will fire regardless of the LED color!

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Safety

The first rule of paintball is: <u>Safety First!</u> Paintball markers propel a paintball at speeds fast enough to cause blindness, even with the barrel removed or at the lowest operating pressures.

Do not play or allow others to play or watch without wearing goggles designed specifically for the sport of paintball. Never allow anyone to lift his or her goggles while a gun is capable of firing. Goggles can fog over, paint can reduce vision and some may be tempted to clean or adjust their goggles during play. Do not ever let this happen for any reason.

- Play only at commercial playing fields. Proper fields will have a Chronograph, referees and clearly marked safety areas. Chronograph your marker before every game at the field's safety limit, usually about 280 feet per second.
- Ramping (shooting more than one ball per trigger pull) dramatically increases the chance of goggle lens failure or goggle dislodgement. Increased safety risks outweigh any perceived advantages of ramping. Goggle manufactures recommend replacement of goggle lenses after a direct hit. Alien advises against the use of ramping modes. Notwithstanding this, ramping is included because some tournaments specify ramping.
- You will be held liable if someone is hurt from a paintball shot from your marker. Make sure you shoot at safe velocities and that everyone has proper eyewear.
- Never point the marker at anyone not wearing goggles.
- Remover the barrel and bolt before looking into the firing chamber and wear goggles or approved safety eyewear
- Use extra caution when the bolt is removed as a ball, or part of a ball, shell can fire out of feed neck or back of marker.
- Read the entire manual before operating the marker. The LPR should not be adjusted until the player has read the LPR section
- Repair of a marker while pressurized increases risk of injury and should be done only by those qualified in the art of airsmithing.
- Do not gas up marker with LPR cap off. The LPR piston will shoot out of the gun at very high speeds if the cap is removed. Only experienced airsmiths should service the LPR piston's O-Rings or seal.
- Servicing the marker should not be done while the gun is in Response mode or a Ramp mode.
- Turn off marker when operation is not desired.

Congratulations on your purchase of the **Independence** paintball marker by:

We believe it to be the best paintball marker available today and the best value.

Limited Warranty: Alien warrantees the Independence against defects in manufacturing for a period of One Year from date of purchase. Copy of sales receipt must be included for all warranty work. Pneumatic valves (solenoids) are not made by Alien and are not coved either by their maker or by Alien. Warranty on wiring harnesses is limited to defects in manufacturing.
Misuse, abuse or alteration of the marker voids the warranty.

Alien will pay for return shipping costs only on warranty work. Owners will pay shipping to Alien for warranty work. Owner will pay shipping costs for both directions on non-warranty work.

Operating Design: The Independence is an open bolt, pneumatic ram design, yet it is a design distinct to Alien. Alien places the solenoid on the ram, and then places the ram and solenoid module on the trigger frame. The constant air supply is attached directly to the ram. This "Independent Ram" eliminates the torturous air paths cut into the body and the lengthy additional hoses. The resulting shorter air passages equates to faster cycling times. The design of the ram housing outside the gun body provides a smaller, tighter, lighter marker and one that has a unique and appealing look.

Alien also utilizes a patented "Sweep Valve" and "Sweep Bolt" to minimize turbulence and to cause the air to flow under and around the ball. The resulting "Sweep Trajectory" improves accuracy. The ball is no longer poked out of the gun, rather swept on a rotating expanding pulse of air towards its destination

A brief use of the Independence will show its improved trajectory, that it is fast, reliable, comfortable to hold and easy to aim and shoot. By taking a new path Alien is **"Light-years Ahead".**

Independence Specifications: Several configurations are listed to help when comparing markers.

Weight:	1 lb. 6.9 oz. without barrel, high pressure regulator, bottle adapter or battery 1 lb. 12.6 oz. with battery, regulator and bottle adapter 2 lb. 0.1 oz with Alien's Mayday barrel attached
Length	8 inches - back of the trigger frame to the front of the body 9.5 inches - back of the trigger frame to the tip of the LPR 21 inches - to the tip of the Mayday barrel
Height	2.5 inches - top of the gun body to opening for the trigger guard (two tubes & top rail of the trigger frame) 7.5 inches - top of the riser to the bottom of the trigger grip 8.5 inches - top of the riser to bottom of bottle adapter
Effective Range	200+ feet with excellent accuracy – paintballs will still break on opponents at over 300 feet
Ball detents	Dual Spyder type rubber catch bumpers
Power	Nine volt. Alkaline batteries are recommended. Batteries use a mAh rating. Batteries that are close to or over the 1,000-mAh rating are best; batteries that are below 600-mAh will give limited performance. We have noticed that some batteries, including Rayovac, can show a solid red LED and not cycle the marker.

Operation:

Because Independence is a high-end, tournament level gun it is assumed that the user has the knowledge to correctly attach a loader and an air tank.

High Pressure Air (HPA) & Nitrogen: The Independence includes an HPA Inline regulator. This accepts high preset tanks (800 to 850 psi), low preset tanks (400 to 500 psi), or adjustable tanks. Adjustable tanks should be set to, at least, the upper limits of low-pressure tanks (500 psi) so as not to starve the Inline regulator and cause slower cycling or low shots. High preset tanks are recommended, as adjustable tanks usually weigh more and some Inline regulators creep with low-pressure tanks.

CO2: CO2 is not recommended. High firing rates will freeze the pneumatic valves in electro pneumatic paintball markers and damage O-Rings. Once frozen, the valve must be replaced.

Barrels and Accessories: Aliens use "standard' barrel threading, the same as found on Cockers and most high-end guns. Standard paintball inline regulators are compatible. The rail for the bottle adaptor is built in. However aftermarket rails can be attached for maximum variation of bottle setups.

Hopper and Paint: Only the fastest hoppers are capable of keeping up with the Independence rate of fire. Likewise the use of top quality paintballs is necessary for highest performance and accuracy. If your Independence is not shooting accurately the cause is almost certainly the paint.

Power:

Pressing the power button turns on the electronics. The LED should be red. If the LED blinks, flashes or pluses red the battery is low. Replace battery before playing. If the LED goes to Green or Blue there is something in the breech. Make sure there is not a ball in the firing chamber.

Firing Modes:

If the LED is green then the Marker is in semi-automatic firing mode. If the LED goes blue, the gun is in automatic or ramping mode. Only highly proficient players, playing in a tournament designed to use ramping, should use ramping modes.

See Software Section for Firing Modes and Programming.

Regulators

For both regulators:
Clockwise (In or Down) lowers the air pressure
Counter Clockwise, (Out or Up) increases the air pressure.
For regular play adjust only the Inline regulator to obtain the desired ball speed.

It is recommended that the only adjustment you use is the Inline regulator. You should not need to adjust the LPR or the dwell.

Dwell, LPR, and Inline Regulator Adjustments:
Three factors control the ball speed.
- ❖ First the Dwell – the time electricity is applied to the solenoid.
- ❖ Second, the Low Pressure Regulator (LPR) pressure – how hard the ram, hammer and bolt are moved.
- ❖ Third, the Inline regulator – the maximum air pressure of the air used to fire the ball.

Dwell:
Maximum efficiency is achieved by opening the cup seal valve for 3.3 thousands of a second. Less and the air pressure must be increased, more and extra air is used.
LPR:
The hammer has to hit the pin hard enough to open it. Softer and the pin opens too little and not enough air escapes. Too hard and the gun has additional kick.
Inline regulator:
For most all paintball markers an Inline Regulator pressure of about 225 PSI yields the best efficiency. Using lower pressure means more air must be released to fire the ball, decreasing efficiency. Higher pressure doesn't increase efficiency and the additional pressure increases the possibility of ball breakage.

After Break-in you may want to optimize the LPR and Dwell setting for maximum efficiency. Begin by putting a new high-grade alkaline battery in the gun and have a full bottle of air. Repeat: New battery and a full bottle of air before you change the settings on your gun. Also have a good supply of both paint and time available.

1. Turn the dwell up 3 or 4 blinks, most guns shoot in the 8 to 9 range, turn the dwell up to 12. Chrono to 280 FPS. Turn the LPR up a quarter turn (screw counterclockwise) if the ball speed increases keep unscrewing until the ball speed no longer increases. Adjust the inline regulator so the gun is again shooting at 280. Lower the dwell one milliseconds (ms) at a time until the ball speed drops. Raise the dwell 1 ms, chrono, then raise the dwell one more ms, if the ball speed again increased, raise it one more. Find the point where one ms changes the ball speed but the next ms doesn't. Then choose the higher of the two for best consistency. Best consistency in ball speed is achieved by having a

little too much dwell. Maximum efficiency is achieved by having a little to low a dwell.

2. After setting the desired Dwell, raise the LPR pressure by about a quarter turn. If the ball speed increases by more than a few FPS the LPR was too low. Turn the LPR up until the ball speed no longer increases and redo step 1. If the ball speed does not increase, dwell is done correctly. Continue to lower the LPR pressure by quarter turns until the ball speed drops by 5 to 10 fps. Once the ball speed drops turn the LPR out - counter clockwise until again shooting at full speed. You will quickly learn how to "feel' the best LPR range. How low the LPR is set before getting inconsistent shots and how high before it has noticeable kick.

3. Once the LPR pressure and dwell are set, further adjustments should be made only with the Inline regulator.

Note:
The dwell is not the time the cup seal valve is open. The cup seal valve opens for 3 to 4 ms, there is no direct correlation between dwell and the time the valve is open. Rather, dwell is the time that electricity is applied to the solenoid valve. Some pistons move with less energy than others. It does not mean that a gun is better or worse because it using an insignificant amount more or less of electricity.

Maintenance: The main maintenance is cleaning after usage to avoid dirt build up on the bolt and trigger. When the LED blinks red after it is turned on, the battery has to be changed.

Sudden inconsistency in shots usually means the battery is low. Always change the battery if the guns performance decreases mysteriously. If you borrow a battery from a buddies bag "that doesn't get it". Batteries have a mAh rating. Batteries that are close to or over the 1,000-mAh rating are best; batteries that are below 600-mAh will give limited performance.

Ball Detents: Double feeding most often comes from worn detents. The detents are the same types that are used by Spyder type guns. They can be obtained at most paintball stores. Clear detents are usually Polyurethane. They can be easily lost – as they are clear and hard to see, but wear very well. Most often rubber detents are black but can be other colors as well. Rubber wears faster.

The following pages on disassembly will show in detail how the gun operates. However the best performance is generally obtained by not messing with the gun.

- The LPR body shouldn't need removal from the gun body. It will take many, many years for the O-Rings to dry out and deteriorate.
- The cup seal valve likewise, should not need to be taken out of the gun. Should a leak develop and the cup seal cap need replacing, it is easier to remove the Cup Seal body than the LPR body.
- The LPR and Inline regulator O-Rings can dry out and should be regressed annually or semi-annually.
- The Independence Rammer (combination Ram and Hammer) operates inside a sealed ram body. Other Rammers units are usually open to contaminants and therefore need to be removed and serviced often. This is not true for Independence. However, by removing the back cap, sliding the Rammer out past the O-Ring and lubing the rod in front of the O-Ring and the O-Ring itself, you can easily lube you Indepence Rammer.
- The solenoid valve's piston has grease on it from the factory. Some players oil their guns internals by putting oil in the bottle adaptor before airing up the gun. This internal oiling washes off the grease inside the solenoid. The oil used is lighter than the original grease and will need to be reapplied or the solenoid valve can fail prematurely. If a player chooses to oil the internals of the gun by putting oil inside the bottle adaptor use only synthetic oil, as petroleum base oils deteriorate the O-rings. Once you have started on this course you must add several drops of oil every time the marker is used. Again, your Independence should operate for hundreds of thousands of shots without any more than cleaning the bolt and changing the battery. The practice of putting lubricant through the bottle adaptor, like constant removal of the Rammer, is not recommended.

Setting the trigger pull: The Independence features a _Critical Paintball_ designed trigger. Adjusting the setscrews breaks the Locktite seal and the setscrews have to be loctited again.

There are four adjustments. Two are adjusted on the front of the trigger. The trigger contact point is the top set screw. Turning the screw clockwise makes the contact point sooner, counterclockwise to make the contact later.

The bottom screw limits the trigger's travel backward, clockwise for less travel, counter-clockwise for more travel.

The setscrew to adjust the trigger return travel can be adjusted by fitting an Allen wrench through a hole in the trigger lever on the under side of the trigger guard. Clockwise increases travel – counterclockwise limits travel.

The setscrew that adjusts the trigger spring's tension is visible when you remove the bolt, remove the Ram Cap, and slide the hammer back. Turning the setscrew clockwise increases tension. Counter-clockwise lessens the tension. If the tension is not getting lighter do not continue to turn or you will screw the setscrew out of the holder. Repeat! If the trigger isn't getting lighter – STOP! It is best to start by increasing the tension to get the feel for the spring and then raise the setscrew until it is at your preference, or it is at the minimum pressure.

To remove the trigger, loosen the setscrew holding the trigger pin with an Allen wrench. This must be done with the body off he trigger frame. Removal of the trigger may cause the trigger spring to drop out and become lost. It is best to remove the gun body and ram body completely from the trigger grip frame. Then remove the trigger spring holder and the spring before removing the trigger pin.

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Low and High (Inline) Pressure Regulators:

- ❖ Clockwise (In or Down) lowers the air pressure
- ❖ Counter Clockwise, (Out or Up) increases the air pressure

LPR

The Low Pressure Regulator design is a common one in high-end paintball markers. A floating piston (8) is suspended between two O-Rings (7) and one inside LPR body (10). The floating piston has a long appendage that both conducts air and holds a seal (9), which blocks the incoming air. The spring (6) between the piston and the LPR body pushes the Piston away from the LPR body to allow air to escape through the LPR body (10). When the pressure between O-Rings 4 and 7 becomes great enough that pressure overcomes the pressure of the spring (6) the piston seal is pushed against a seat in the piston body and the airflow stops. A setscrew (1) in the LPR cap pushes the second piston, the one holding the O-Ring (3) That piston in turn pushes a lighter spring (5), which rests against the same piston (8) as the stiffer spring. Screwing down the setscrew (1) increases the pressure on the lighter spring, which lowers the LPR pressure. The balance between the two springs plus the pressure of the inside the cap is what regulates (changes) the operating pressure.
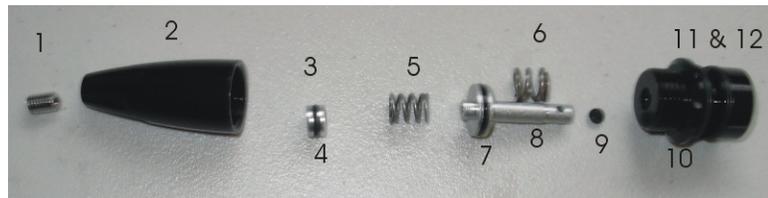
To service your LPR, remove the cap. It should unscrew easily, if it doesn't there is pressure in the cap. Purge the gun. Once the cap is removed, the "T" shaped piston can slide out. Once the piston is removed the top spring easily falls out. You can take the setscrew out of the cap and then press out the piston (3) and re-grease that O-Ring (4). There is an additional O-Ring LPR housing that seals on the piston (3). It can be removed and can be re-greased. Both are a number 010 O-ring and can be seen by looking into the LPR body once the piston has been removed. The only service usually necessary is to re-lube the O-Rings. In the event that you have LPR creep that is not fixed by lubing the O-Rings or replacing the O-Rings then the 3/16th's seal at the bottom of the "T" piston (9) should be removed and replaced.

LPR creep is only possible if air is escaping past seal in the bottom of the "T" piston. Air leaking past the piston O-Ring (5) will have an audible leak from the surface between the LPR cap and the Front gun body. The same air leak is heard if you remove the LPR body and find damage on the 018 O-rings sealing the LPR body. Bad O-Ring seating on the cap piston (8) causes air to leak between the LPR cap and the front setscrew.

Alien Air Force

Inline Regulator (high pressure):

❖ Clockwise (In or Down) lowers the air pressure
❖ Counterclockwise out or up increases the air pressure

Notable is how few parts there are on the 'new for '09' Inline Regulator. Cap, Base, Piston and Adjuster, plus Bellville washer springs.

The regulator top holds a single Bellville washer spring, the larger disk. This spring needs to have the dome facing the Piston. On the piston stem are six more spring disks.

The base holds the high-pressure air inlet (the adjuster) a ball bearing, a setscrew and a stainless steel disk. Raising and lowering the adjuster changes the pressure. A setscrew and a ball bearing move the adjuster. Below the ball bearing a stainless steel disk reduces wear. At the top of the base is a 012 O-Ring that seals on the Piston stem.

In the unlikely event air leaks out the setscrew hole in the base, the adjuster can be removed and the two 010 O-Rings can be replaced, by first removing the setscrew and then pushing up the ball bearing and adjuster. The adjuster is threaded inside to allow the screw that holds the trigger frame and body together to be screwed into the adjuster, so that the adjuster can be pulled out of the base. Do not allow the ball bearing or the disk to fall out of the base. However the adjuster and O-Rings move so little that deterioration over its useful life is so minimal that servicing the adjusting should be unnecessary.

Servicing of the inline regulator should be limited to annual or semi annual lubricating of the O-Ring on the piston and the O-Ring at the top of the base. The seal is easily removed and can be replaced. Replacing the seal, the two O-Rings on the adjuster, the O-Ring on the piston and the O-Ring in the base, completely rebuilds the **'Alien Air Force'** Inline Regulator.

Assembly and Disassembly:

It is best NOT to take the board out of the marker as the on/off pin and the board pins are easily lost. Also the wires can be easily broken. If the board is removed it is best to replace the top board pin first, then put the board in place and then slide the bottom pin in place.

To access the wires you should take off the left panel. This allows the wires to be lowered when disassembling and assembling the gun.

To access the tournament lock it is easier to remove the right panel. There are four toggle switches; the first three should be down. To enable programming Number four should be up. To lock the gun put all four switches down. Remember it's the switch furthest away. The gun is factory set in "Normal" mode; the tournament lock is not on.

The Independence can be pulled into its three main pieces, powered up, aired up and the ram operated. This ability makes Independence exceptionally easy to trouble shoot. Problems are found quickly and easily, and are just as easy to fix.

Disassembly:

To disassemble remove the bolt, take the grip panel off the left side of the gun (barrel facing away from you) and remove the wires to the eyes and the solenoid and straighten them out. Next, remove the two screws on the underside of the gun, one under the trigger guard and one at the back. Then slide the trigger frame and the gun body apart while feeding the wire up through the trigger frame until the Trigger Frame is completely separated from the Body and Ram.

The marker components are visible. The valve pin assembly is easily viewed, as is the hose and the hose fittings. Hose fitting are quick release type. To remove the ram – without pressure in the hose – push the fitting release toward the fitting body, pull on the ram body; the hose will easily slide out of the fitting.

Pressing on the valve pin with an Allen Wrench should easily open it.

With the setscrew to the Cup Seal Valve in place you can see that the threads holding the setscrew are missing on the sides. This is because of the oval cut made to match the cut in the top of the cup seal for the Sweep airflow.
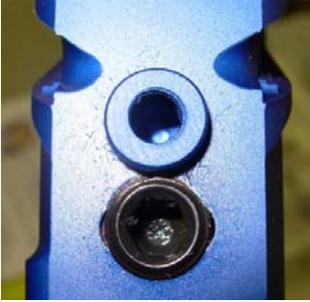
You can install the longer LPR hose supplied with the gun to gas up the marker while the ram is separated from the gun body to check for the source of any leak.

To remove the Cup Seal Valve assemble, first check to make sure the guns is not holding pressure, then remove the setscrew and, with needle-nose pliers, pull the cup seal assembly out of the gun body. However the Cup Seal should only be removed because you have a leak down the barrel.

The front edges of cup seal valves are prone to damage. Alien's valve body has raised edges to protect the seat if the valve body is dropped or hit against another surface.

Look for a foreign substance on the body or the cup seal cap. This can be caused from dirty air in a compressor. Next, make sure the O-Rings do not have any nicks. Then check the raised ridge on the Cup Seal with your fingernail. If you can feel a bump or catch, that is where it is leaking. A small nick can cause a leak and once it is nicked it is likely that you will have to replace the Valve body.

Oil the O-Rings before replacing the Cup Seal assembly and put the pin on the spring before sliding the cup seal back into the body. Don't force the Cup Seal as the O-Rings can be cut when replacing the valve in the body.

MAKE SURE the open end faces inside the body! The cap sits against the ridge. If your gun no longer shoots, but still cycles, turn the cup seal around!

As previously mentioned, there is little reason to take the LPR body out of the body. In the event of a leak down the barrel, removing the ram and taking the cup seal out the back is usually the best way to service. To remove the LPR detach the Inline Regulator. One screw holds the LPR body to gun body.

Reassembly:

Trigger fame should be assembled with the right side panel on, left panel off. Trigger and spring stop in place; trigger spring tension set, trigger travel set, setscrews loctited. The On/Off pin is in place and the board pins are seated. To make sure the trigger wires are not broken, turn the board on and pull the trigger. Because the eye harness is not connected the LED should be green or blue. Pulling the trigger should change the LED color, as the eyes do not see ball dropping down and being fired.

Gun body should be assembled. The cup seal valve's setscrew is tightened. Valve pin should open with light pressure. Ball detents are in place. The LPR inspected to see that both springs are in place and the LPR's piston is lubed on both ends with the seat in place.

Inspect Ram to see that the cap in on and the screws holding down the solenoid are tight. The screws are small however and most anyone can strip the body with too much force. Snug and locktited!

Slide the ram into the gun body while sliding the hose into the fitting. The gun now consists of two half's: the gun body with the ram, and the Trigger frame.

Feed the eye wires and the solenoid wire into the trigger frame – but do not connect them to the board. Align the body over the trigger frame, looking at the screw holes in the gun body and the trigger frame *the trigger frame should be about a half inch forward of alignment to the gun body.* Notice the channel cut between the side of the trigger frame and trigger. One side has the trigger spring stop; one side has a channel to hold the eye wires.

Reach in with an Allen wrench and push the eye wires into the groove in the trigger frame. The wires do not have to go fully into the groove as there is also a groove cut into the gun body for the wires. Pushing them into the trigger frame groove holds the wires so they do not get cut.

Do not pull to tightly on the eye wire when you tuck them into the groove in the trigger frame as this can pull the wires down inside the eye covers and misalign the eyes. This is also why you have **aligned the trigger frame about a half and inch forward in relationship to the gun body,**

While looking at both side of the gun, and pulling the solenoid wires and the eye wires into the trigger frame slide the two half's together. The two fit snugly without force. Once you are satisfied that that the eye wire is not being pulled between the eye covers and the trigger frame's wire guide groove, that all excess eye wire between the guide and the frame is pulled into the trigger frame and the excess wire to the solenoid is pulled into the frame – double checking to see that the solenoid wire is not sandwiched between the to gun half's - screw the gun together with the two screws, one under the trigger guard and one at the back of the gun under the ram. **DO NOT OVER TIGHTEN.**

Connect the wire leads to the board and screw the grip panel on.

Software Section:

1. Turning ON and OFF
Press the Power Button, the LED lights up and marker is ON. Press and hold till LED flashes white and release, marker is off.

1.1. Forced Shot
Hold the trigger back for 1 second and the marker fires once, even when there is no ball in the breach. This clears a ball that has rolled past the eye or starts a sound activated hopper.
Caution! Forced Shot is active if the marker has a ball in the breach or not! Whenever the trigger is pulled and held for 1 second the marker will fire one shot. A ball that has rolled past the eyes or a ball(s) in the barrel will fire. Broken paint, broken shell or other objects in the gun or beach will be fired.

1.2 Eyes ON /Off
Marker powers on with eyes on, to turn eyes off quickly press Power button.

1.3 Eye Error
In the event of eye malfunction the marker turns the eyes off automatically and the LED changes color. When the eyes function normally the eyes turn back on and the LED color changes

1.4 LED Display Color Chart

Green	Ball in breach - Semi-Auto mode	Will Fire
Blue	Ball in breach – Ramping Fire modes	Will Fire
Red	Ball not in breach - normal modes	Will Not fire (Forced shot fires)
Purple	Eyes off	Will Fire
Yellow	Eye error	Will Fire
White	Ball not in breach - Demonstration mode	Will Fire
Teal	Ball not in breach - Training mode	Will Fire
Red	Ball in breach - Demo / Training modes	Will Not Fire.

2. Battery Status Indicator
The battery level is checked when marker is powered on.

Battery level	LED display	Action
More than 60%	Nothing	Directly in firing mode
Between 40% and 60%	Blinking RED	Blinking RED for 3 seconds. Then goes into firing mode. Solenoid will "probably" cycle, Inconsistant velocity.
Between 20% and 40%	2 Flash RED	2 Flash RED for 3 seconds. Then goes into firing mode. Solenoid usually will not cycle.
Less than 20%	RED strobe	RED strobe for 3 seconds, then automatically turn off

A trigger pull bypasses battery check and marker is in firing mode.
In the event your gun stops cycling always change the battery with a fresh high quality battery.

3. Tournament Lock Switch
SW4 is the tournament lock switch. First 3 switches are down.
Normal mode. Fourth switch is up. Allows changes to settings and operation modes. Tourna
Tournament Lock: Fourth switch is down. Software changes are not possible. The LED blinks OFF every 2 seconds to show the tournament lock.

4. 'Demonstration' and 'Training' Modes
- ❖ Tournament Lock is off
- ❖ Hold trigger back and press Power button - continue holding the trigger until the LED is flashing WHITE, release trigger. The LED is WHITE, marker is in Demonstration Mode
- ❖ Quickly pressing the Power Button toggles between Training mode (teal) and Demonstration (White)

Caution! This mode is used with air. Marker fully cycles at the MROF EYE ON rate of fire. The marker will not fire in Demonstration mode if there is a ball in the breach, but if there is a ball in the barrel it will fire that Ball! Always handle the marker as if it is loaded

4.1 Demonstration Feature
White LED - to test different firing modes and check the marker's speed. Uses the last firing mode stored. Because no ball is fired, air escapes quickly and air is quickly consumed.
The Eye On ROF cap limits the trigger pull. If the MROF is set to unlimited the MROF is limited to 50 BPS, below 30 is the useful maximum.

4.2 Training Feature
TEAL LED - Demonstration mode, but the Dwell is reduced to half. Allows practice firing the marker without it fully cycling. It uses less air and isn't as loud.

5. Firing modes
Five (5) basic modes can be used with the other settings to generate all tournament legal firing modes. To change firing modes see the "Programming Mode" section.
Every firing mode is affected by the MROF (Maximum Rate Of Fire) setting.

1 Semi-Auto Fire
The marker fires one ball per trigger pull. Trigger Memory and BWT (Ball Wait Time) settings are active.

2 Ramping Fire
- ❖ When the trigger pull rate reaches the Ramp Activation level point the Ramp Scale adds extra shots at the selected rate. The ROF limit is the MROF setting.
- ❖ If the pull rate drops below the Ramp Activation level, ramping stops.
- ❖ The Safety Shots apply if the time between the trigger pulls is longer than the Ramp Time Out setting.
- ❖ Trigger Memory and BWT settings are active.

3 Burst Fire
- ❖ Each trigger pull fires the number of balls in the Ramp Scale setting.
- ❖ Maximum Rate of Fire is capped at the MROF setting.

4 Full Auto Fire
- ❖ Continuous fire when trigger is held down.
- ❖ Maximum Rate of Fire is capped at the MROF setting.

5 Response Fire
- ❖ Fires when trigger is pulled and when released.
- ❖ Trigger Memory and BWT settings are active.

6. Quick Start Modes

The Quick Start Modes are packets of setting for tournaments or that are popular

- ❖ Tournament Lock is off.
- ❖ Hold trigger press Power Button - continue holding the trigger back until the LED flashes YELLOW. Release the trigger. LED is RED.
- ❖ Cycle through choices by pulling the trigger.
- ❖ To select a mode, hold the trigger for 3 seconds The LED flashes multiple colors. Release the trigger. After 3 seconds the marker shuts off automatically. Next time the marker will turn on in the selected mode.

LED Color	Quick Start Mode
Solid RED	Millennium/Centurio Mode
Solid GREEN	PSP Mode
Solid BLUE	NXL Mode
Solid YELLOW	NPPL Mode
Solid PURPLE	Response Mode
Blinking RED	Full Auto Mode
Blinking GREEN	Semi-Auto Mode
Blinking BLUE	Burst Uncapped (PSP Uncapped)
Blinking YELLOW	Reset to factory defaults

Warning: Changing these settings will change several settings at once on the marker. Resetting to factory defaults will reset all the parameters to the factory default, including the Dwell.

6.1 Settings for each Quick Start Mode

Quick Start Modes will change each of the following settings listed below. Individual settings can be adjusted afterward.

Millennium/Centurio settings		
Max ROF Eyes On	15	15 bps
Max ROF Eyes Off	15	15 bps
Fire Mode	2	Ramping
Safety shots	1	1 shot
Ramp activation	15	7.5 trigger pulls a sec (133.3ms)
Ramp time out	9	Ramp activation time (133.3ms)
Trigger memory	2	2 balls
BIP wait time	2	100 ms
Ramp scale level	2	2 shots

PSP settings		
Max ROF Eyes On	15	15 bps
Max ROF Eyes Off	15	15 bps
Fire Mode	3	Burst
Safety shots	3	3 shots
Ramp time out	1	1 sec
Trigger memory	3	3 balls
BIP wait time	5	250 ms
Ramp scale level	3	3 shots

NXL settings		
Max ROF Eyes On	15	15 bps
Max ROF Eyes Off	15	15 bps
Fire Mode	4	Full Auto
Safety shots	3	3 shots
Ramp time out	1	1 sec

NPPL settings		
Max ROF Eyes On	1	Uncapped
Max ROF Eyes Off	20	20 bps
Fire Mode	1	Semi-Auto
Trigger memory	1	1 ball
BIP wait time	2	100 ms

Response settings		
Max ROF Eyes On	20	20 bps
Fire Mode	5	Response
Safety shots	1	1 shot
Ramp time out	1	1 sec
Trigger memory	3	3 ball
BIP wait time	3	250 ms

Full Auto settings		
Max ROF Eyes On	25	25 bps
Fire Mode	4	Full Auto
Safety shots	10	10 shots
Ramp time out	1	1 sec

Semi-Auto settings		
Max ROF Eyes On	20	20 bps
Fire Mode	1	Semi-Auto
Trigger memory	1	1 ball
BIP wait time	5	250 ms

Burst Uncapped settings		
Max ROF Eyes On	1	Uncapped
Fire Mode	3	Burst
Safety shots	3	3 shots
Ramp time out	1	1 sec
Trigger memory	5	5 balls
BIP wait time	5	250 ms
Ramp scale level	5	5 shots

6.2 Reset to factory defaults

❖ Tournament Lock Switch is off.
❖ Hold the trigger and press Power button – continue holding until the LED flashes YELLOW. Release the trigger. The LED is RED.
❖ Cycle through Modes by pulling the trigger until you get to Reset to factory defaults (blinking Yellow)
❖ Hold the trigger for 15 seconds. The LED will flash multiple colors. Release the trigger. After 1 second the marker will shut off automatically. The next time when you turn on the marker it will have default factory settings.

Resetting to factory defaults resets all the settings including the dwell. You will need to readjust the dwell and other settings to the desired values.

7. Programming Mode

❖ Tournament Lock is off.
❖ Hold trigger back and turn the On/Off ON - continue holding the trigger until the LED flashes multiple colors. Release the trigger. The LED is RED.
❖ Cycle trough the settings by pulling the trigger. The LED will change colors corresponding to the setting options selected.
❖ To change or verify a setting hold the trigger for 1.5 seconds.

The LED color and settings indicate each mode shown in the following table:

LED color	Setting	Range	Default value
Solid RED	Dwell	1 to 40	12
Solid GREEN	Electrical debounce	1 to 20	2
Solid BLUE	Mechanical debounce	1 to 20	6
Solid YELLOW	TON M-Debounce	1 to 20	6
Solid PURPLE	Eye delay	1 to 40	2
Blinking RED	Max ROF Eyes On	1 to 30	20
Blinking GREEN	Menu Type	1 to 3	1
Blinking BLUE	Max ROF Eyes Off	8 to 20	15
Blinking YELLOW	M-Bounce sensitivity	1 to 20	4
Blinking PURPLE	Fire Modes	1 to 5	1
2 Flash RED	Safety shots	1 to 12	3
2 Flash GREEN	Ramp activation	1 to 20	10
2 Flash BLUE	Ramp time out	1 to 9	1
2 Flash YELLOW	Maximum trigger memory	1 to 5	1

2 Flash PURPLE	BIP wait time	1 to 6	2
RED Strobe	Ramp scale	1 to 5	2
GREEN Strobe	Eye error time	2 to 12	7
BLUE Strobe	FSDO	1 to 30	5
YELLOW Strobe	FSDO time	1 to 10	10

7.1 Changing settings

Select an option above. Pull and hold the trigger for 1.5 seconds, the LED will turn off. Release the trigger and the LED will blink, in the setting color, the number of the current value. To skip displaying the current value, press and release the trigger quickly. To change the current value, pull and release the trigger the number of the desired new value. The LED will blink WHITE each time the trigger is pulled - wait 3 seconds.

If the new setting has changed the LED will blink WHITE the number of times of the new value, then flash multiple colors. You are back at the main menu. If the setting was not changed the LED will blink in the setting color, the number of times of the old value and then flash multiple colors to show you are back in the main menu.

To change other settings, cycle through the menu by pressing and releasing the trigger. To exit programming mode, turn the marker OFF.

Solid RED **Dwell**	**1 to 40**	**Default = 12**
Duration in milliseconds of signal sent to the solenoid. It is important to adjust to your marker. Solenoids react differently. A low dwell will result in velocity inconsistency; too high causes inefficiency.		
Changing to a higher dwell can cause higher or unsafe velocity. Always use a chronograph after adjusting the dwell.		

Solid GREEN **Electrical debounce**	**1 to 20**	**Default = 2**
Controls how aggressively the chip filters for an electronic switch bounce. A higher value is less likely that multiple shots are fired on a single trigger pull		

Solid BLUE **Mechanical debounce**	**1 to 20**	**Default = 6**
A higher value is less likely to fire more than one shot or "bounce" especially when firing slowly. Default setting of 6 is a conservative value. You might want to try this value at 2 or 3, for faster shooting semi-auto mode.		

Solid YELLOW **TON M-Debounce**	**1 to 20**	**Default = 6**
Controls a mechanical bounce, especially at higher speeds. Higher value means the system is more likely to pick up and eliminate mechanical bounce, but it also slows you down.		

Solid PURPLE **Ball In Place (BIP) delay**	**1 to 40**	**Default = 2**
The delay after a ball is in breach before the marker fires. Setting adjusts in 0.5 milliseconds per increment. Setting 2 means 1 ms. Slower loaders require a higher value. Adjust to the right value for your loader. Low setting with slow loader can cause Eye Malfunction		

Blinking RED **Max ROF Eyes On**	**1 to 30**	**Default = 20**
The maximum rate of fire while the eyes are on.		
Setting *Value*		
1 Uncapped		

2	15 bps
3	14.4 bps
4	14.6 bps
5	14.8 bps
6	15.2 bps
7	15.4 bps
8	15.6 bps
9 - 30	9 - 30 bps

Blinking GREEN	**Simple or Expanded Menu**	**1 to 3**	**Default = 1**
Limits or expands the options available in the programming mode. Setting 1 is a simple menu (only first 7 options available) and setting 2 is an extended menu (all the options available). Setting 3 is Hardware Testing Menu. With this setting ON, the next time the marker turns ON it will start in hardware testing mode. Use this setting only under a technician's supervision when you need to trouble shoot the board or the marker.			

Blinking BLUE	**Eyes Off Max ROF**	**8 to 20**	**Default = 15**
The maximum rate of fire with an eye error or eyes disabled. A low value slows down your marker. A higher than normal value will break balls.			

Blinking YELLOW	**M-Bounce sensitivity**	**1 to 20**	**Default = 4**
Measures mechanical bounce as the distance between legitimate trigger pulls. Lower causes extra uncontrollable shots, more than 6 will slow you down.			

Blinking PURPLE	**Fire Modes**	**1 to 5**	**Default = 1**
Sets the firing mode. See fire mode description for more information.			
1. Semi-Auto			
2. Ramping			
3. Burst			
4. Full Auto			
5. Response			

2 Flash RED	**Safety shots**	**1 to 9. 10 is None Default = 3**
Controls how many shots must be fired in Semi-Auto mode before ramping or auto modes are activated. 1-9 shots. 10 = no safety shot, instant on.		

2 Flash GREEN	**Ramp activation**	**1 to 20**	**Default = 10**
Number of trigger pulls/second needed to activate and/or sustain the ramping/burst mode. Adjusts in 0.5 trigger pulls/second increments.			
Example: Value 10 means that when you reach 5-trigger pulls a second, the number of trigger pulls is multiplied by the Ramp Scale value.			

2 Flash BLUE	**Ramp time out**	**1 to 9**	**Default = 1**
The number of seconds (adjustable from 1 to 8) that can pass after the last trigger pull before the marker is forced to shoot the safety shots on the next trigger pull.			
When set to 9, ramp time out is equal with ramp activation time.			

2 Flash YELLOW	**Max. Trigger memory**	**1 to 5**	**Default = 1**
If the ball is not seen when the trigger is pulled, that trigger pull is stored in memory to be used when a ball is seen. This limits the maximum number of pulls that can be stored, and the maximum number of shots that can be fired after the last trigger pull. If the time passed since last trigger pull is equal to or higher than the BWT time, the number of pulls memorized is reset to zero.			

2 Flash PURPLE	Ball wait time	1 to 6	Default = 2
The time the marker waits for a ball to seen after a trigger pull. If a ball is not seen in this period of time the Trigger Memory will be cleared. It adjusts in 50 milliseconds per increment.			
Example: 2 = 100ms.			
Setting 6 means disabled. If ball is not in the breach at the time of a trigger pull, no shot is fired.			

RED Strobe	Ramp scale level	1 to 5	Default = 2
The number of shots fired per trigger pull. Used in ramping mode or burst mode.			
Works with the Trigger Memory.			
Will never ramp more shots than the Maximum Trigger Memory.			

GREEN Strobe	Eye error time	2 to 12	Default = 7
The time the marker is waiting for the eye to clear after firing before activating the EYE Error.			
Time is set 10ms increments.			
Example: 7 means 70ms			

BLUE Strobe	First Shot Drop Off (FSDO)	1 to 30	Default = 5
The length of time, in 20-second increments, that the marker must be inactive before the dwell for the first shot is increased with the selected FSDO Time (below).			
Example: 5 means 100s.			

YELLOW Strobe	FSDO time	1 to 10	Default = 10
Amount of time (in milliseconds) added to the dwell on the first shot after the period of inactivity set in FSDO (above). Setting 10 means FSDO time = 0, so no time is added to the dwell.			

8. Software version

The software version loaded into the marker is indicated when the marker is On/Off. By holding the On/Off button longer than 1 second after the LED flashing WHITE, the LED will indicate the software version by blinking a number of times in BLUE and then a number of times in GREEN. The LED will keep showing the software version as long as the On/Off button is pressed.
Example, LED blinks once BLUE, then twice GREEN, the software version is1.2