



68 AUTOMAG

MINIMAG

Instruction
Manual
Level 7



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WARNING: This is not a toy. Misuse/careless use may cause serious injury or death. Eye protection designed specifically for paintball use must be worn by the user and any person within 200yds(183m). Read Operation Manual before using.

WARRANTY

Congratulations on the purchase of your new Airgun Designs marker! There have been some important changes in the way Airgun Designs handles warranty repair work, so please read this thoroughly.

In the past, Airgun Designs produced markers of the highest quality and provided premium service by fixing most markers for free. We charged a correspondingly high price for this combination of quality and service. In reviewing our policies and realizing that the majority of players in today's paintball world are on a limited budget, we have changed both our pricing and warranty policies. In the past, by charging a higher price and repairing markers for free, we rewarded the people who did not take the time to fix or maintain the markers while excluding the people on a more limited budget.

We are reducing the prices significantly on most of our product line to make them more affordable to the majority of the paintball public in 1998. We don't have to tell you that when you reduce the selling price something else has to go to reduce the cost. **WE DID NOT REDUCE THE QUALITY OF OUR PRODUCT IN ANY WAY** in order to reduce the selling price to our customers. The marker you purchased today is the same in every way as the markers we produced in the past. The only thing that has changed is the warranty policy.

Our New Warranty Policy

We now offer a 90 day limited warranty from the date of original retail purchase. This warranty covers parts, labor, manufacturing defects, and malfunctions. It does not cover abuse such as wrapping the gun around a tree when you lose a game nor does it cover damage that occurs as part of an accident such as a house fire.

After the 90 day limited warranty ends we now have what we call the punch card warranty program. There is no actual punch card, but there are one to four stars laser engraved above the serial number on your marker's valve assembly. Each star entitles you to a free repair of your marker. When you send your marker in for repair we will remove one star and so "punch" your card. After we have punched a star there is a 30 day warranty to ensure we fixed your marker properly. If the marker still has the same problem it was sent in for we will fix it again without punching another star as long as the marker is returned to us within 30 days.

Once the stars are used up we will still service your marker, but we will charge you a standard rebuild fee which covers the replacement of soft parts and return ground shipping. There will be additional charges for hard parts such as bolts or sear assemblies. Just as there is a 30 day warranty of repairs done under the punch card program, there is also a 30 day warranty on rebuild repair work. This punch card warranty program is good for three years from the date of manufacture. In this way you can save the punches for times when you really have a problem and we will be happy to fix it for you.

Parts not manufactured by Airgun Designs

In evaluating in-house repairs, we have found that about 20% of the time we are fixing problems caused by modifications and/or aftermarket accessory parts installed in our markers. In most cases we must replace these aftermarket parts with our own parts to make the marker work again. We are sure you can see that this is very unfair to us and eventually to you in higher prices. **We will no longer fix markers for free either under the limited warranty or the punch card warranty if the marker has an aftermarket part and/or accessory that causes a problem.** Some examples of modifications and/or parts that can cause problems include: painted mainbodies, two finger triggers, wooden grips, aftermarket o-rings, aftermarket seals, aftermarket bolts, aftermarket on/off assemblies and aftermarket trigger frames.

In many cases, aftermarket accessories such as barrels, expansion chambers and grip frames do not cause a problem and will not void the warranty. Many aftermarket parts and accessories are available. We have no problem with aftermarket parts being installed in our markers. However, please keep your stock parts on hand and replace them first if you have problems with your marker. If you are still having problems when all the original parts are installed, then call us for assistance or to arrange for your marker to be sent to us for repair.

*****Return Authorization Required*****

We have always required that you call and get a return authorization number before you send in your marker. This is for your safety and insures a speedy repair. With an RA number we know your name and address, the problem, and the date promised as soon as the marker arrives at our factory. If a marker comes in without an RA number someone has to track down the owner, find out what's wrong, and then enter the information in the computer system. **Therefore, we will no longer accept repairs without an RA number. Packages without RA numbers clearly marked on the outside of the package will be returned to the sender!**

Technical Support

Our technical support hotline (847-520-7225) will not change. Technical support is available by telephone any time from 9:00 a.m. until 11:30 a.m. and 1:00 p.m. until 4:30 p.m. (Central Time) on Mondays through Fridays. Please note that our telephone lines are busiest on Mondays and Fridays. Please have your serial number ready so that we can look up your file quickly. Send in your warranty card so we will have you on file when you call.

Our Commitment

Here at Airgun Designs we want to continue our long history of producing quality products and providing quality service. Airgun Designs is focusing on giving you, the player, the best possible value for your money. We hope that this new policy reflects our commitment to you, the player, now and into the future.

Tom Kaye
President

SAFETY

THIS PAINTBALL MARKER IS NOT A TOY! This paintball marker should be treated as a dangerous instrument and should always be treated with respect. Never point a paintball marker at anyone not properly attired. If misused or improperly maintained, this paintball marker can cause serious bodily injury, including blindness, or even death. Please read all safety instructions and directions in this manual *before* using this paintball marker.

Do not point or shoot this paintball marker at animals. Do not point or shoot this paintball marker at any person unless you and your target are engaged in paintball activities and are wearing proper safety gear including approved paintball goggles, mask, and pads. Follow all maintenance instructions carefully. If you are unsure about any aspect of the maintenance procedures, contact your local dealer or the Airgun Designs, Inc. Tech Line at (847) 520-7225.

This paintball marker is always armed and cocked when an air supply is installed. Always use the safety located behind the trigger on the grip when an air supply is attached or installed. Disengage the safety only when on a playing field and the game has started. The safety is off and the paintball marker *will* fire when the red ring of the safety pin is showing.

Always chronograph this paintball marker before using it. Never shoot this paintball marker when the chronograph readings exceed 300 feet per second! There is a blow-off valve incorporated into the valve mechanism that will release air pressure if pressure exceeds a predetermined amount. This blow-off valve is factory set and is not user adjustable.

Always remove the air supply from the paintball marker and dry fire in a safe direction before disassembling. The velocity adjusting nut is on the back of the regulator body. Do not disassemble the velocity adjusting nut while the paintball marker is under pressure. If air is leaking out the back of the velocity regulator nut the paintball marker is over-pressurized and will shoot at a higher than intended velocity. Reduce the regulated pressure by backing off the velocity regulator nut and re-chronograph the paintball marker. If problems persist call your dealer or Airgun Designs, Inc. **Do not put your fingers into the breech area or down the ball feed tube while firing the paintball marker!**

The pressure regulator allows gas under pressure to push the trigger forward after shooting. An excessively hard trigger pull may indicate the system is overpressurized. Do NOT fire a paintball marker that has excessively hard trigger pull; call your local dealer or Airgun Designs, Inc. immediately.

FAST START

This is a quick overview of how to use the 68AUTOMAG/MINIMAG™ for the experienced player. Introducing air pressure to the paintball marker will charge and cock the system. The system is a blow forward from open bolt, similar in concept to a cork in a champagne bottle.

The barrel utilizes a twist lock mount; a one-quarter twist is all that is required for

full lock. The regulator nut is on the back of the valve body and requires only one turn to adjust from 200 to 300 fps. Air venting out of the back of the regulator indicates that the internal blow-off valve is responding to over pressure in the system and the velocity should be turned down.

Field stripping is accomplished by unscrewing the field strip screw underneath the frame after removing the air supply. THE TRIGGER MUST BE PULLED TO SLIDE THE VALVE BODY OUT. There is a locking pin for alignment in the regulator body which allows the valve body to only come out part way before you must twist the valve body clockwise to continue sliding out the back. Reinstall in the same manner. Once removed, the entire valve and bolt assembly is available for cleaning.

Maintenance on all active o-rings can be accomplished without tools. See specific headings for valve body disassembly.

When adjusting the regulator nut, shoot several times before chronoing to allow the regulator piston and spring to seat properly. Always start below your intended velocity and work your way up. When firing the paintball marker, it's important to remain aware of how many balls are in your loader. If the quantity runs too low the slight blowback past the bolt will bobble the balls in the feed tube, thus preventing a positive ball feed. This increases the likelihood of ball breakage.

Always use high quality, fresh paintballs. The blow forward action aggressively pushes the ball into the barrel before firing and we have found that lower grades of paint cannot withstand the acceleration.

A slide-on sight rail is available from your local dealer or Airgun Designs, Inc.

FIRST TIME PROBLEMS

There are several first time problems to watch out for. Many times the paintballs will not feed because the recoilless design does not jiggle the loader. You must remain aware enough to keep the balls feeding.

Next, the bolt can stick forward causing the trigger to lock due to either paint chips wedging between the bolt and breech or, when degassing the paintball marker, caused by turning off the tank and shooting those last few blooping shots. When the bolt sticks forward the trigger will not come forward. Remove the barrel and push the bolt back until the trigger clicks forward.

The paintball marker will give very little indication that it is running out of gas; by the time you see the velocity drop you are 20-30 shots away from total shut-down. Additionally, if you use a constant air tank with an on/off valve make sure you open it all the way. The same is true for pin valves; you must rotate the tank at least one full turn after initial gas up or the tank will not feed enough air. **DO NOT USE A SIPHON TANK. IT WILL NOT WORK AND WILL MOST LIKELY DAMAGE THE PAINTBALL MARKER!!**

HISTORY AND THEORY OF DESIGN

The 68AUTOMAG/MINIMAG is the result of three years of development from the Airgun Designs research team. At the 1988 Poconos tournament we displayed our first semi-auto prototype, the PANTHER. The PANTHER was a blowback single-barrel design that was very advanced for its time. The paintball marker design and prototype were sold, but never produced.

The second, completely new paintball marker was developed during the following year and was code named P2 (for PANTHER #2). It was a blowback design that featured interchangeable barrels, no tools takedown to all seals, and reduced parts count. During this time we saw a tremendous improvement in pump paintball marker technology, giving the players field strip capability, doubling efficiency, and reducing weight. We knew that players would not be content with a semi-auto that simply shot when you pulled the trigger if it did not also meet the performance they had come to expect from their pump paintball markers.

After two years of research and development, we knew there were two inherent problems with a blowback design. First, while the heavy bolt being blown back was necessary to slow the action down, it reduced efficiency. The heavier the bolt, the more energy it consumed; lightening the bolt made it harder for the bolt to open the valve far enough. The second fundamental problem was in allocating how much energy went to blow back the bolt (requiring a fixed amount) versus propelling the ball (variable with tank pressure and velocity setting). With all of our blowback designs velocity was dependent on tank pressure which caused velocity to drop when firing enough to chill the tank down.

The semi-auto firearm from which the blowback design comes has a relatively fixed energy source (gunpowder) which burns the same no matter what the temperature, humidity, etc. There has not been a semi-auto firearm made that can shoot a clip of bullets all at the same velocity with only half the powder in some shells.

After two years, it was with some disappointment that we closed the book on our blowback designs and wiped the drawing board clean. We knew what our customers wanted and after the successes of the MICRO-C/A™, 6-PAK+™ and the TURBO VALVE, we didn't want a letdown. Starting fresh, the team took a "bottoms up" approach in starting with a list of performance specifications and then coming up with the design. The specifications list was as follows:

- Light weight
- Pistol size for one handed use
- No tools takedown
- High efficiency
- Interchangeable barrels
- Consistant velocity
- Infinite velocity adjustment
- No internal parts exposed
- No premature parts breakage

This was a tough list but the team, undaunted, used the two years of accumulated knowledge and evaluated sixteen different combinations of valves and bolts and focused on what was soon to become P3. We knew that pressure in the tank could vary as much as 100% and the only way to get everything consistent was to incorporate a pressure regulator that would provide consistant velocity and infinite velocity adjustment. Second, any air not coming out behind the ball would be wasted and would be coming from a hole that would allow dirt in. Third, a light weight bolt for good efficiency combined with a trigger mechanism that did not try to stop the bolt while it was moving all resulted in a totally new design for us and the sport of paintball.

The paintball marker you have just purchased is P4, a further refined version of P3. Its function can be broken down into three independent stages: regulation, chamber fill, and chamber dump. Stage one occurs when an air source is connected to the paintball marker and the system builds up pressure. At a predetermined pressure, set by the regulator nut, the regulator valve closes, thus sealing off the air source from the rest of the paintball marker. The pressure inside the paintball marker is now approximately 400 psi even though CO₂ tank pressure may vary from 600-1000 psi under different temperatures. Stage two happens when the trigger is released, opening the ON/OFF VALVE and allowing the air chamber to fill to a regulated pressure of 400 psi.

Stage three is where everything happens. The air chamber is designed like a champagne bottle with a cork (the bolt) stuck in the opening. The cork (or bolt, in this case) wants to pop out, but is held in place by the sear. When you pull the trigger the sear first closes the ON/OFF VALVE (just before releasing the bolt) shutting off the air chamber from the regulator. This gives the paintball marker a precise amount of regulated air charge. Next the sear releases the bolt and, like the cork, it starts moving forward out of the bottle(power tube). At some point after the ball has been pushed into the barrel, the cork leaves the end of the bottle and all the air rushes out. Once the air is gone the BOLT SPRING which has been collapsed from the bolt moving forward pushes the BOLT back into the now empty air chamber. The process starts over when the trigger is released.

As with all designs, nothing is perfect and there are some inadequacies in this design. All pressure regulators, by the nature of their design, cannot fill a chamber instantly but must fill most of it quickly and then taper off to hit the desired pressure. (You do the same when pouring a glass of water.) When firing faster than three shots a second, the air chamber will not be fully filled and you will experience a 10-20 fps drop in average velocity. The other problems revolve around CO₂ itself. We usually think of CO₂ in terms of a liquid or a gas, but in reality it also takes the form of "steam." CO₂, like water, boils when heated and becomes steam; the steam will still exist as a form of "humidity" until its temperature is above 87 degrees. Pressure changes will also cause water or CO₂ to boil, but this is usually less understood by the general public. Everyday examples of water boiling caused by pressure are cavitation by boat propellers (boiling caused by low pressure) and car radiators (not boiling caused by high pressure).

What does this mean to your average paintball player? Simple! When you shoot

rapidly, the pressure in your tank drops causing the CO₂ to boil, the steam goes into your paintball marker's air chamber, you fire the paintball marker discharging the air chamber behind the ball (dropping pressure again), the steam boils into gas (steam is still a liquid and boils into 30 times its volume in gas) and the ball velocity varies. Switch tanks and you now have warm steam going into a cold paintball marker and, just like the mirror in the bathroom, you get liquid condensing in the paintball marker.

PERFORMANCE

The paintball marker will get a minimum of 400 good shots from a 7 oz. CO₂ tank under normal conditions. An eleven inch barrel gives the best efficiency; longer or shorter barrels will reduce these numbers.

Cold weather performance (below 50°) on CO₂ will be poor. Since the paintball marker is designed to function at a predetermined pressure, outside temperatures below freezing will not generate enough CO₂ tank pressure for adequate velocity. If you regularly play in these conditions, we recommend that you invest in a quality high pressure system (i.e. compressed air or nitrogen setup).

Take-up is the movement of the trigger before it comes in contact with the sear, after sear contact continuing to pull through fires the paintball marker. The trigger in the 68AUTOMAG/MINIMAG has been designed to have a "snap" action with no take-up to give the shortest possible stroke and thus the highest possible firing rate. The average person can fire 4-5 shots per second but, when charged with adrenaline, this can climb to 6 per second. Note that the loader can only feed 7 balls per second under ideal conditions, so be careful!

LUBRICATION

We find that customers who properly lubricate their paintball markers once a week have the fewest problems. To lubricate your 68AUTOMAG/MINIMAG properly, drip 4-6 drops of AUTOLUBE into the air inlet closest to the valve. Then gas up and dry fire the paintball marker several dozen times with the barrel removed (to prevent oil build-up in the barrel).

In addition, once a month remove the valve body and spray oil into the holes marked -OIL-. You may also use automotive grease (i.e. wheel bearing or any light grease) on the spring pack and Regulator Piston O-ring.

VELOCITY ADJUSTMENT

The velocity of your 68AUTOMAG/MINIMAG is adjusted by increasing or decreasing the regulated pressure. This is accomplished by turning the REGULATOR NUT located on the back of the regulator body. Only a minimal amount of rotation is necessary to adjust the velocity. We recommend that you always start at a low velocity setting and turn the adjustment screw clockwise to your desired setting.

Always shoot several shots to seat the regulator piston and spring. High veloci-

ties will cause the blow-off valve built into your system to vent air out the back of the regulator body. If you ever hear air venting, stop and re-chrono the paintball marker immediately. We find the best performance to be in the 270-280 fps range. Occasionally grease the threads of the regulator nut.

We offer an optional 3-piece Tournament Cap that is designed to prevent the regulator nut from backing out and thereby reducing velocity under severe playing conditions.

CONSTANT AIR TANKS

DO NOT USE A SIPHON TANK ON YOUR PAINTBALL MARKER!!!

Liquid CO₂ in this paintball marker will cause all the active o-rings to leak and the velocity will not be controllable. Make sure the tank valve is feeding air into the paintball marker fast enough when rapid firing; make sure the valve is completely open. Paintball markers that dramatically lose velocity often have this problem. For vertical tank and remote vertical tank setups, always use standard tanks that have been weight checked to ensure proper fills. Horizontal tanks should be anti-siphon. Contact your local dealer for information on an anti-siphon tank.

The vertical bottle adapter is an accessory for the 68AUTOMAG and a standard feature on the MINIMAG. It helps reduce the possibility of the paintball marker "going liquid" by mounting the standard air tank vertically.

When using CO₂, steps must be taken to keep liquid from entering the valve. The most effective setup we can recommend is a full size expansion chamber vertically mounted in front of the trigger frame and a remote tank. The hose would run from the A.I.R. valve to a vertical adapter mounted on the bottom of the rail, in front of the trigger frame. The expansion chamber screws into the adapter just like a tank. A hose would then run from the bottom of the chamber to remote tank positioned vertically on your back (in a pouch, on your belt?).

Many people who do not like remote tanks mount their tanks horizontally off the bottom of the trigger frame or main rail. Any horizontal tank should be anti-siphon. Anti-siphon tanks are tailored to specific adapters. They are setup for, and cannot be interchanged with other CA adapters. Remote tanks should be standard (Neither siphon nor anti-siphon).

Overall, remote tanks are more effective because they are vertical. Keep in mind that no setup is 100% effective in keeping liquid CO₂ out.

Below 50°F freezing will still occur, even with an expansion chamber and remote. If you plan on playing in cold weather, seriously consider a high pressure system.

FIELD STRIPPING

Field stripping the 68AUTOMAG/MINIMAG is accomplished by first degassing and removing the air supply, then unscrewing the knurled field strip screw at the

rear of the frame. To remove the valve body you must FIRST pull the trigger and THEN pull the valve body out. The valve body has a pin that slides in a Z-shaped slot in the rail. To remove the valve body pull it straight back 1/4 inch, rotate the valve body slightly (being careful to keep the 68AUTOMAG logo aligned). The valve body should then pull straight out the back, opening the paintball marker for cleaning.

CLEANING AND MAINTENANCE

To quickly clean the paintball marker without disassembly simply use a bucket of clean water and swish the paintball marker body in it WHILE THE PAINTBALL MARKER IS FULLY PRESSURIZED! Keeping the paintball marker pressurized keeps the water out of the internal workings of the valve body. After hard use the paintball marker should be taken down and all exposed parts cleaned and inspected for wear or problems. Lightly lubricate all surfaces and re-assemble according to instructions. To deep clean your paintball marker start by field stripping down to the valve body. Remove and clean the POWER TUBE O-RING (see POWER TUBE section), lightly lubricate and reinstall. Then remove and clean the REGULATOR VALVE and REGULATOR SEAT (see REGULATOR VALVE). The spring on the REGULATOR VALVE will catch particles of debris that come from your fill tank. Always clean the spring thoroughly; pay particular attention to the sealing edge that contacts the REGULATOR SEAT. The REGULATOR SEAT should be cleaned carefully and inspected for any embedded particles; these particles can cause the regulator to leak slowly and can also cause the gun to shoot hot.

Install with the wide end of the REGULATOR SEAT in first (see REGULATOR VALVE). With the REGULATOR BODY off, unscrew the REGULATOR NUT completely and remove the SPRING PACK; it will fall out. Use a paper clip to push the REGULATOR PISTON out by inserting the paper clip wire through the REGULATOR SEAT hole in the other end of the REGULATOR BODY. Clean the REGULATOR PISTON, lubricate and reinstall (see RE-ASSEMBLY OF VALVE).

PAINTBALLS

There are many different kinds of paintballs on the market, all with different specifications. The one thing that is consistent is that low quality paintballs will perform poorly in the 68AUTOMAG/MINIMAG. Always use fresh, high quality paintballs and try many different types and colors to find the best type suited for your paintball marker and playing conditions.

A common problem that we are all concerned about is ball breakage. Ball breakage was the one area we spent the most time on in the 68AUTOMAG/MINIMAG's development. There are two ways balls break in your paintball marker: first, because the ball did not feed all the way into the breech and was cut in half by the bolt; this is addressed in the LOADER section and is not a concern here. Second is the impact from the air blast. Because the paintball marker can shoot twice as much paint in the course of a game it will appear that, on a per game basis, you are breaking twice as many balls. Our trials show that

a properly setup paintball marker shooting quality paint will break approximately 3-4 paintballs per thousand. In comparison, low quality paint will break 1 in 50. A good test for shell strength is to drop several hundred paintballs one at a time from a height of 6 feet. Balls that consistently survive 6-7 bounces are considered fresh; balls that break within 3 bounces are either stale or have weak shells.

If you know the paintball marker is setup properly and you still experience problems, switch to a different brand or color and try again.

LIQUID IN THE VALVE

Liquid CO₂ can enter the air chamber of an airgun and when expelled into the barrel behind the ball it instantly boils into gas that is many times the volume of the liquid. This causes a hotter than normal shot and, depending on the volume of liquid, can show velocity readings in excess of 350 fps. This action is known as supercharging and is extremely dangerous and should be avoided at all times. **The blow-off valve will not protect against supercharging because the liquid is at the normal pressure when it is in the air chamber!** To prevent supercharging follow these basic rules: 1) never shoot the paintball marker at the ground since this allows the liquid to run straight into the valve; 2) never overfill a bottle since a higher than normal liquid level will drain fluid into the valve; 3) keep your paintball marker at outside temperature because a cold valve body allows liquid to remain in its liquid state instead of boiling into gas.

In addition, we have found that putting a warm bottle on a cold paintball marker causes the warm CO₂ vapor to enter the air chamber where it condenses into liquid; this is identical to freezing down a 7 ounce tank before filling from the warmer 50 pound tank — avoid this.

LOADER

When you receive your 68AUTOMAG PowerFeed or MINIMAG you also receive a free ViewLoader™ and elbow. Always keep at least twenty balls in the loader when fast firing. This will keep the balls from being blown up into the loader from the bolt blowback. The blowback WILL help the balls feed when the hopper is full.

Ball breakage is common with first time users of the 68AUTOMAG/MINIMAG due to the recoilless action and the tendency of the balls to hand in the loader. Become aware of the need to shake the paintball marker to keep the balls flowing and listen for the balls bobbling telling you to reload. If you find that the balls are cut in half in the breech, look at the loader or your technique.

Some elbows used with the ViewLoader will require smoothing out on the inside for maximum flow; make sure that there are no sharp corners or edges to catch balls on. The most reliable firing method is tri-burst until you become accustomed to keeping the balls feeding.

BARREL

The barrel on your 68AUTOMAG PowerFeed and MINIMAG is made from the same aluminum stock as the famous Bud Orr Sniper™, long known for its accuracy. The barrel lock is a stainless detent pin mounted in the paintball marker rail. To remove the barrel, twist the barrel counter clockwise one-quarter turn and pull straight out. To reinstall slide the barrel up to the stop; then, while exerting steady pressure, rotate the barrel to find the detent slot and continue to push straight in and then rotate clockwise into the detent position. The o-rings on the barrel serve to give the barrel a friction fit; they do not seal air pressure.

O-RINGS

The o-rings in your 68AUTOMAG/MINIMAG are all high quality 90 durometer urethane or teflon for long life and abrasion resistance. Replace any damaged o-rings with Airgun Designs, Inc. supplied replacements.

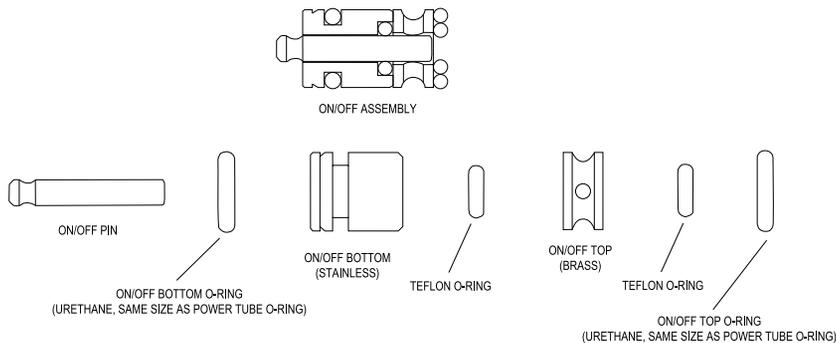
O-rings should only be lubricated with Autolube.

NUBBIN

Airgun Designs barrels utilize a wire nubbin to retain the paintball in the breech and to prevent double feeding. The wire nubbin will automatically compensate for all size balls and should give long life if not abused. If double feed problems develop, bend the wire so it protrudes slightly further into the bore. When properly installed, each nubbin should protrude about the thickness of a matchbook cover into the breech.

ON/OFF VALVE

The ON/OFF VALVE assembly is located on the bottom of the valve body and is actuated by the back end of the sear. Its function is to shut off airflow to the air chamber when firing and recharge the chamber when the trigger is released. It consists of three parts: the ON/OFF TOP, the ON/OFF BOTTOM, and the ON/OFF PIN (see diagram below).



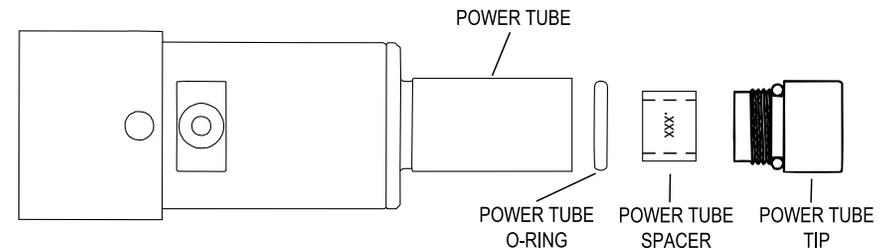
There are four o-rings in the assembly: two in the top of the valve body hole (one inside the other) and two more on the ON/OFF BOTTOM. There is an assembly diagram laser engraved on the valve body to show the proper assembly order. There are two small and two large o-rings in the assembly; only the small teflon o-ring in the bottom of the valve body is an active o-ring. The small active teflon o-ring can be swapped with its teflon double.

POWER TUBE

The Level 7 marker incorporates a POWER TUBE that is welded on to the air chamber. There is a blue urethane bumper at its base to keep the bolt from impacting the valve body on its return stroke. The brass POWER TUBE TIP is screwed into the front of the power tube and is prevented from unscrewing by a urethane o-ring seated in its base. It is important that this POWER TUBE TIP is tightened properly to avoid stripping the POWER TUBE TIP threads. To remove, use a coin to unscrew the insert from the POWER TUBE. Directly underneath the POWER TUBE TIP is the POWER TUBE SPACER and beneath that is the POWER TUBE O-RING. The POWER TUBE O-RING is an active seal that receives substantial abuse and should be inspected for wear regularly. It is 90 durometer urethane and should only be replaced with an identical replacement. If you need to replace it on the field, the o-rings in the ON/OFF VALVE are the same, giving you two potential spares to swap out.

Problems with the POWER TUBE O-RING occur when the paintball marker is not kept lubricated or when liquid CO2 passes through the system creating ice crystals that prevent the o-ring from sealing. Insufficient lubrication or ice causes spontaneous barrel leaks that are usually short lived but are an annoyance in the field. If ice is causing the barrel leak, continuing to fire will only prolong the problem; you must pause long enough to warm up the o-ring. An unlubricated o-ring will usually re-seal itself within several shots. If the barrel continues to leak and the action of the moment does not allow you to make repairs, hold the trigger back to stop the leak. When ready to fire, release and fire quickly; holding the trigger back after each shot, or during any pause. This method will give you reduced velocity, but will keep you in the game.

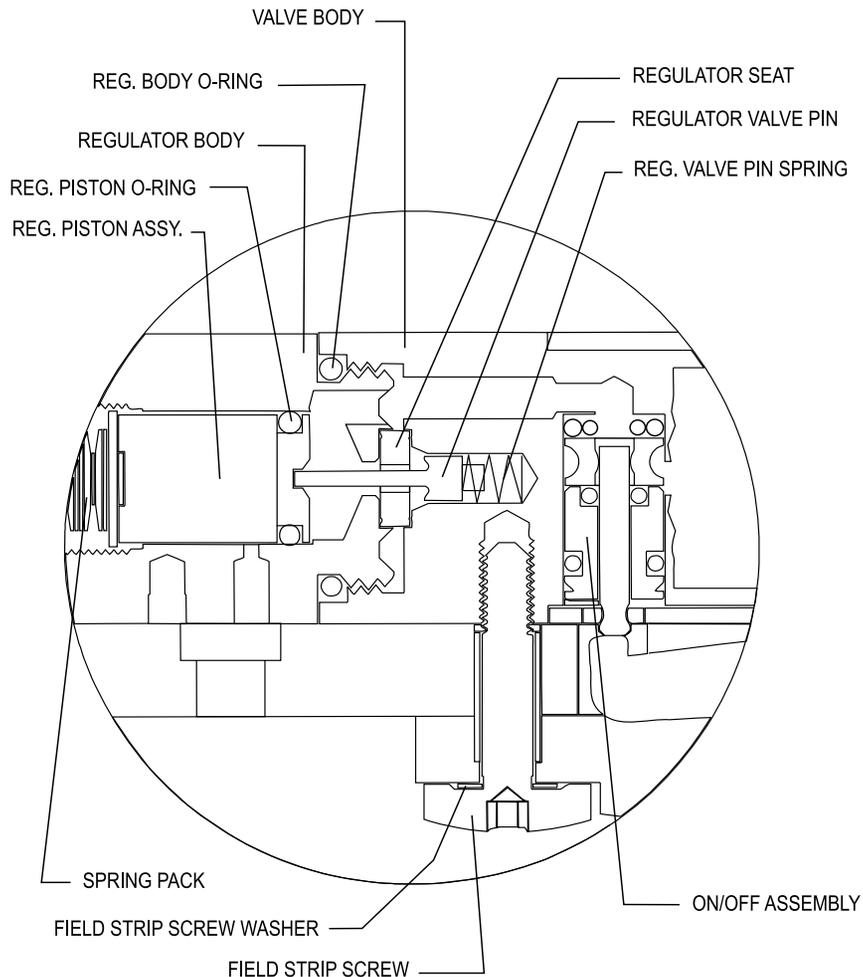
REMEMBER when reinstalling the POWER TUBE parts: O-ring first, POWER TUBE SPACER next, and then the POWER TUBE TIP. (See diagram below)



REGULATOR VALVE

The REGULATOR VALVE is the heart of the system. It is accessed by unscrewing the VALVE BODY (which has the air inlet) from the REGULATOR BODY (which has the velocity adjusting nut). Once unscrewed, you will find the REGULATOR VALVE and SPRING protruding from the VALVE BODY.

The REGULATOR VALVE and SPRING are held in by spring pressure and can be pulled out as one unit. On the REGULATOR BODY you will see a urethane washer (REGULATOR SEAT) snapped into its hole; this is the most critical seal in the marker and must be inspected regularly and kept completely clean. If this seal leaks the paintball gun goes full pressure, the trigger gets hard, and the BLOW-OFF VALVE vents out the rear of the gun. Paintball markers venting out the BLOW-OFF VALVE usually have dirt on this seal; to prevent problems, regularly wipe this seal with a clean cloth. To reassemble, snap the REGULATOR SEAT back in its hole; it will only snap in and stay one way, but it can be reversed and carefully reassembled if a problem develops. Next push the REGULATOR VALVE and SPRING assembly back in its hole in the VALVE BODY until the 68AUTOMAG/MINIMAG logo lines up. If you forget how the parts go together, there is a diagram laser engraved on the VALVE BODY showing the correct relationship of the REGULATOR VALVE and the REGULATOR SEAT.



BLOW-OFF VALVE

The BLOW-OFF VALVE is self contained in the REGULATOR PISTON and is **NOT** user adjustable. It is a safety device for venting air from the paintball marker if abnormally high pressure occurs in the regulator or air chamber. It is factory set to vent automatically at 650 psi. Occasional short bursts of air venting out the VELOCITY ADJUSTING NUT usually means that liquid was present in the system; this liquid boiled, causing increased pressure and was vented off. Always check your velocity any time the BLOW-OFF VALVE has vented.

RE-ASSEMBLY OF VALVE

Assuming you have all the valve parts identified in front of you, begin with the REGULATOR BODY (rearmost end of paintball gun). Find the REGULATOR PISTON (brass 1/2" round with o-ring) and insert o-ring end first into the back of the REGULATOR BODY followed by the SPRING PACK, large washer first (looks like a bunch of washers stacked on a pin). Next screw in the REGULATOR ADJUSTING NUT finger tight to complete the back end of the paintball gun. On the end of the REGULATOR BODY that has threads and a large o-ring snap in the REGULATOR SEAT, which completes the subassembly.

Next, find the VALVE BODY (air inlet on one side) and the ON/OFF VALVE parts according to the diagram on the VALVE BODY: large and small o-rings first, ON/OFF TOP next, ON/OFF BOTTOM (small stainless part with two o-rings) and finally the ON/OFF PIN (silver pin 1/8" diameter, 3/4" long). The REGULATOR VALVE ASSY (small silver pin with large head and small coil spring) goes into its hole (central hole in VALVE BODY) with the spring end entering the hole first. The REGULATOR BODY can now be screwed into the VALVE BODY until the logo lines up.

Finally, reassemble the POWER TUBE end. Find the POWER TUBE O-RING (cream-colored 1/4" OD) and place it into the POWER TUBE, followed by the POWER TUBE SPACER (small brass ring) and finally the POWER TUBE TIP. Tighten the POWER TUBE TIP as tight as possible with a coin to complete the assembly. Don't forget to slide the BUMPER over the POWER TUBE until it rests against the VALVE BODY.

RE-ASSEMBLY OF BODY

First set the mainbody on the rail, lining up the "pem"(spot welded) nut into its hole in the rail. Next fit the trigger frame assembly up to the rail. Carefully feed the TRIGGER ROD into the trigger frame until it pokes out behind the trigger. The rod must be fed in from back to front finding its way underneath the safety pin; when properly installed you should see the tip of the pin from the side of the paintball gun about midway down the trigger. To finish the frame sub-assembly, screw in and tighten the front frame screw firmly with the supplied 1/8" allen wrench.

The assembled VALVE BODY and BOLT can now be slid into place in the back of the mainbody being careful to line up the logo on the valve, and lock pin in the rail. The final step is to tighten the FIELD STRIP SCREW and your marker is ready to go.

UPDATES

We are constantly pushing the leading edge of paintball marker technology and are continuing to make refinements in our paintball markers. As a service to our customers, we offer updates to Level 7 for Level 5 and Level 6 markers at no charge. Please note that all 68AUTOMAGS since serial number CF3456 and ALL MINIMAGS have been built as Level 7. The update from Level 6 to Level 7 reduced ball breakage by enlarging the air chamber to function at a lower pressure.

ACCESSORIES

Call your local dealer or Airgun Designs, Inc. at (847) 520-7507 for information on replacement parts or factory produced accessories for the 68AUTOMAG/ MINIMAG series of paintball markers.

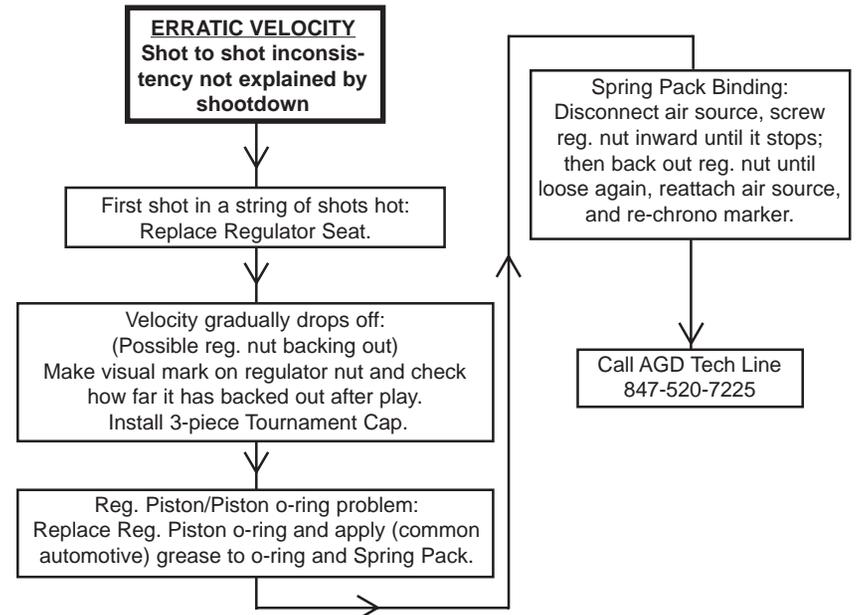
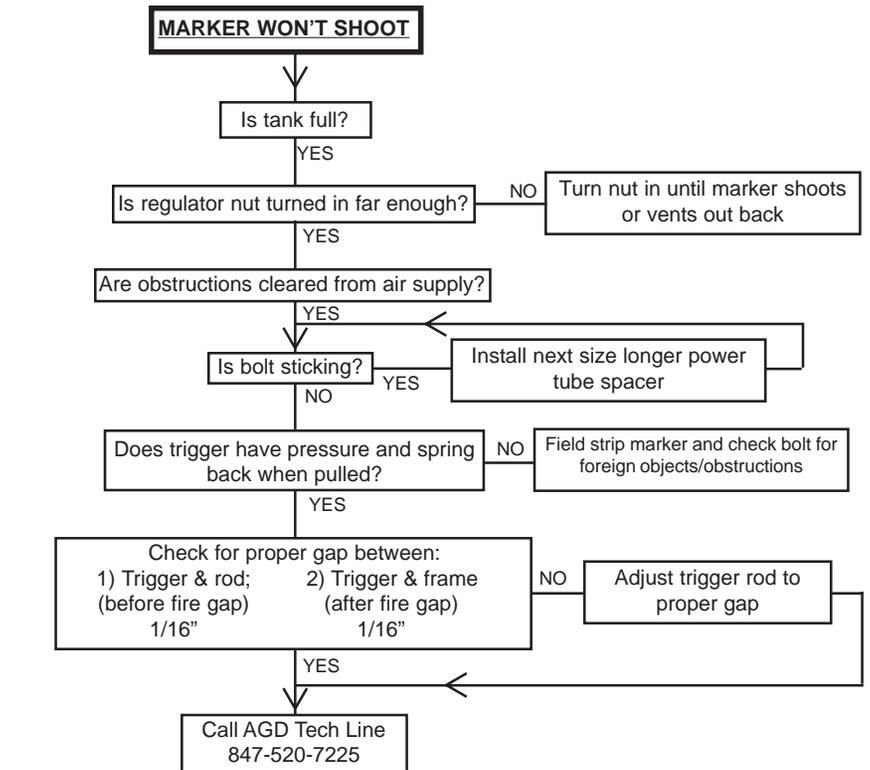
TROUBLESHOOTING

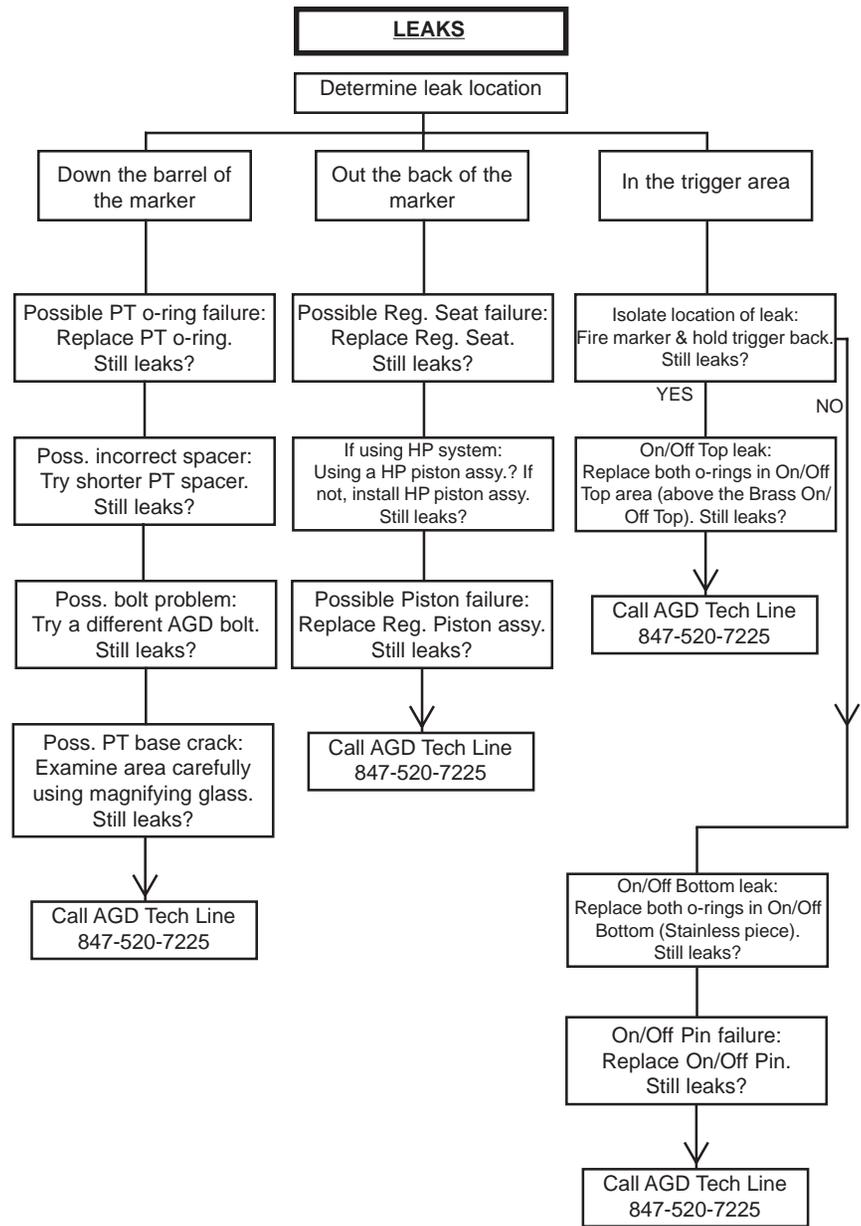
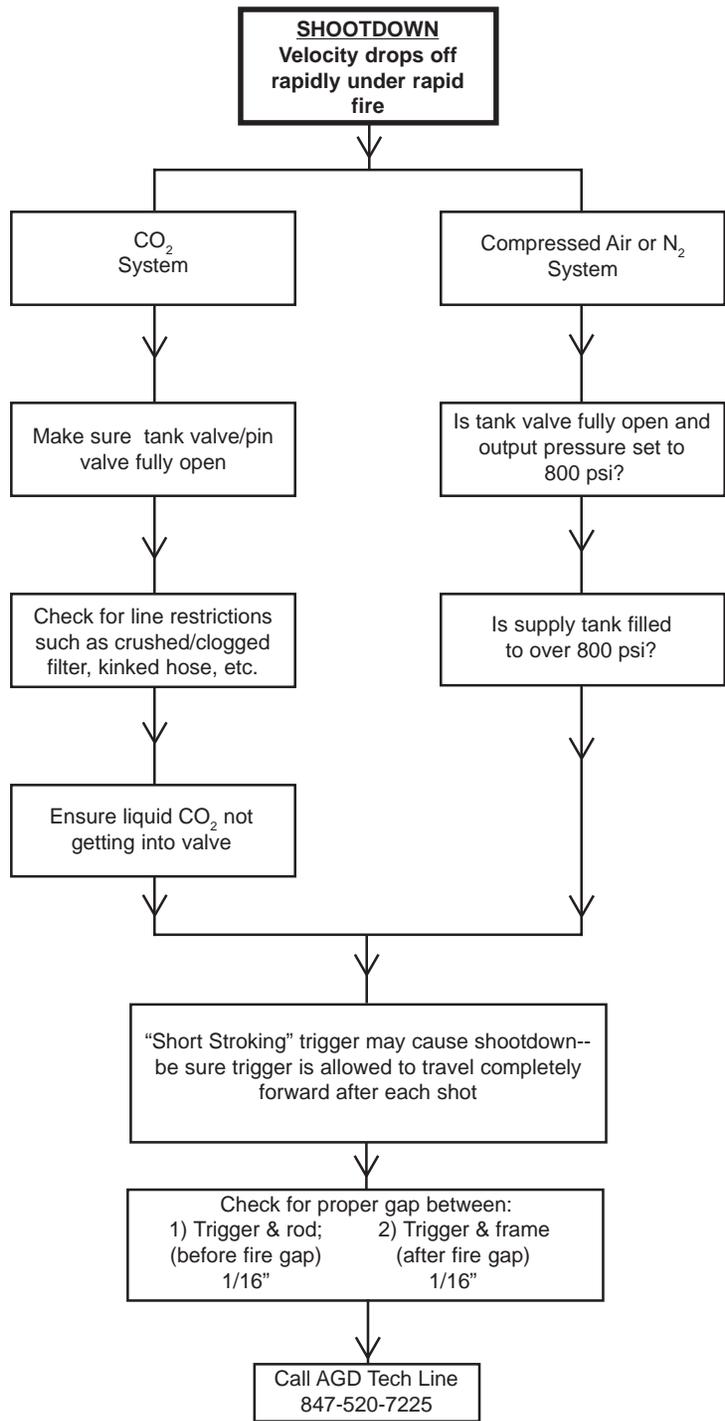
Does marker shoot at all? If not go to debug chart on following page.

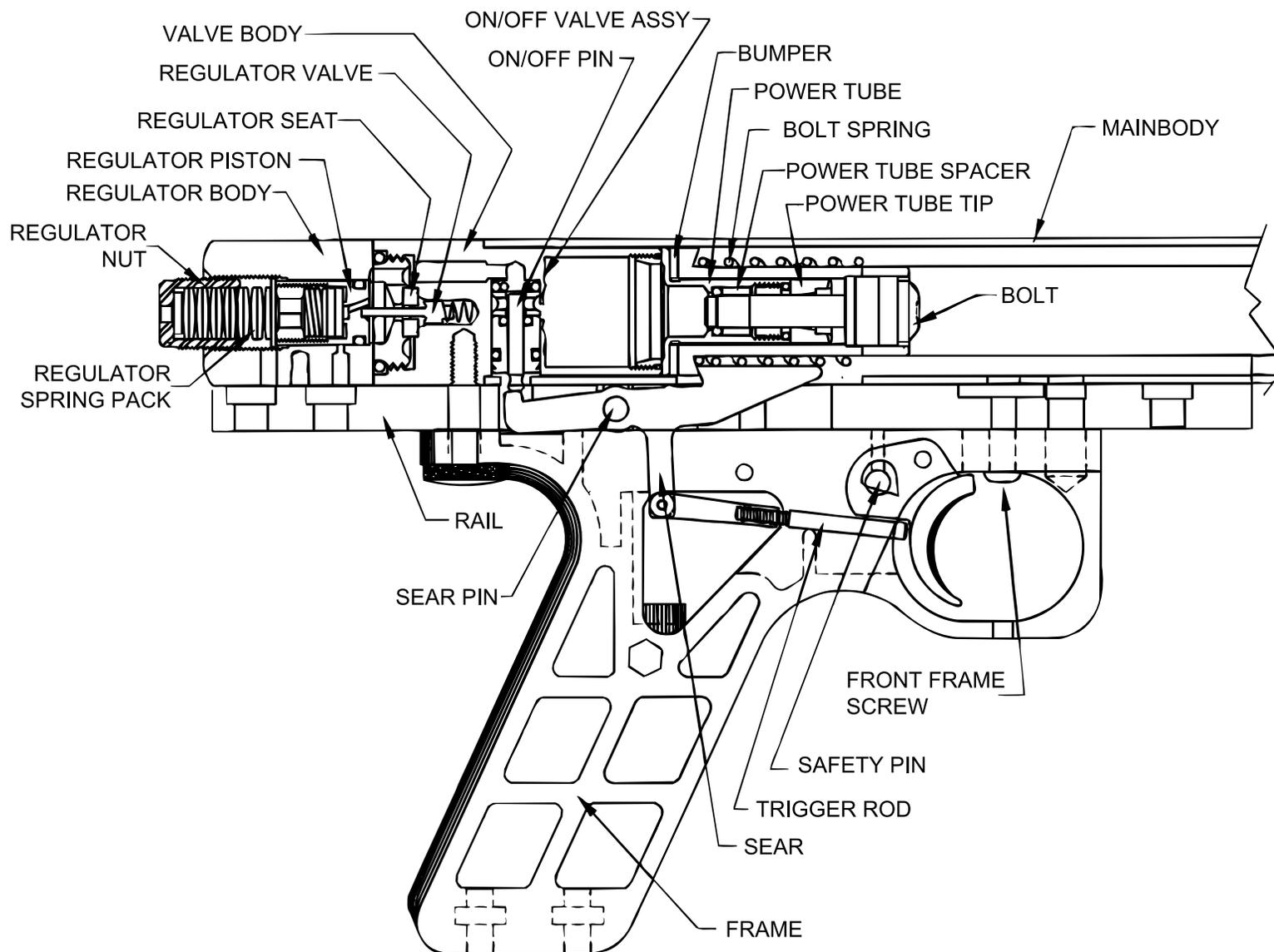
Does marker exhibit erratic velocity? Debug chart on following page.

Does marker shoot but exhibits shutdown? Debug chart on page 22.

Does marker leak? Debug chart on page 23.







FUNCTIONAL STEPS

1. AIR TANK SUPPLIES AIR AT 800-1000 PSI TO REGULATOR
2. REGULATOR TAKES PRESSURE TO 375 PSI
3. AIR FLOWS THROUGH ON/OFF VALVE AND FILLS AIR CHAMBER
4. TRIGGER IS PULLED, FIRST CLOSING ON/OFF VALVE THEN RELEASING BOLT
5. BOLT MOVES FORWARD AGAINST SPRING PRESSURE UNTIL POWER PISTON EXITS POWER TUBE.
6. AIR IS RELEASED INTO BOLT CAVITY AND FIRES BALL.
7. MAIN SPRING RETURNS BOLT TO COCKED POSITION.
8. TRIGGER IS RELEASED, BOLT IS LATCHED, AND ON/OFF VALVE PRESSURIZES AIR CHAMBER.