

# **Level 10 Guide**

## **New from Airgun Designs - the Level 10 Mod - for all AGD Markers!**

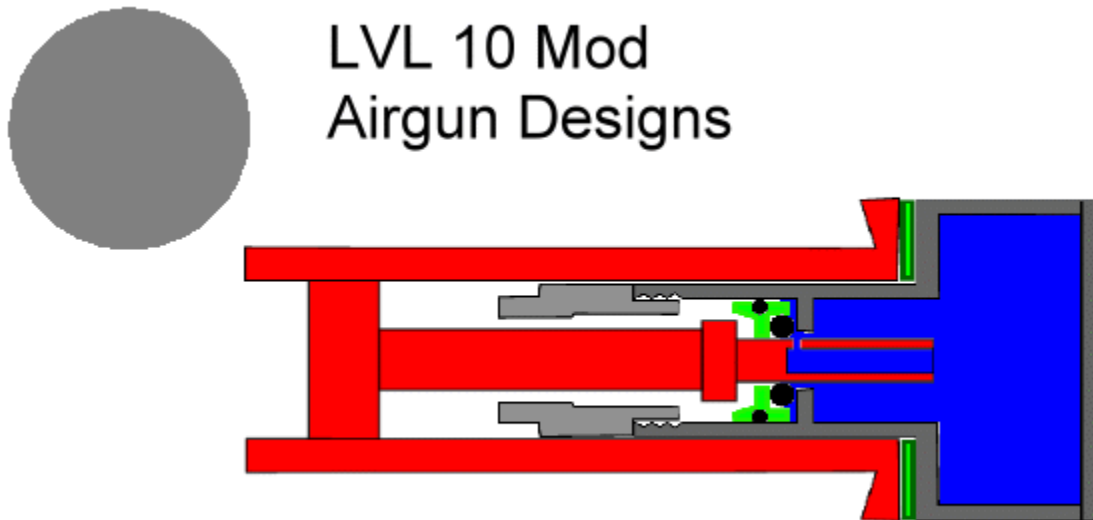
AGD has been hard at work, refining the performance of their Automag line of markers. What they came up with is the new Level 10! Level 10 replaces the stock bolt and power tube tip with the newly redesigned Superbolt II and power tube tip assembly kit. With the kit properly tuned, your Automag bolt will bounce off of even the most brittle of tournament paint! Kits work on all AGD markers, including the Automag, MiniMag, RT, RT Pro, and E-Mag.

This page is your one stop resource for information on what the new Level 10 does, how it works, and how to set it up properly.

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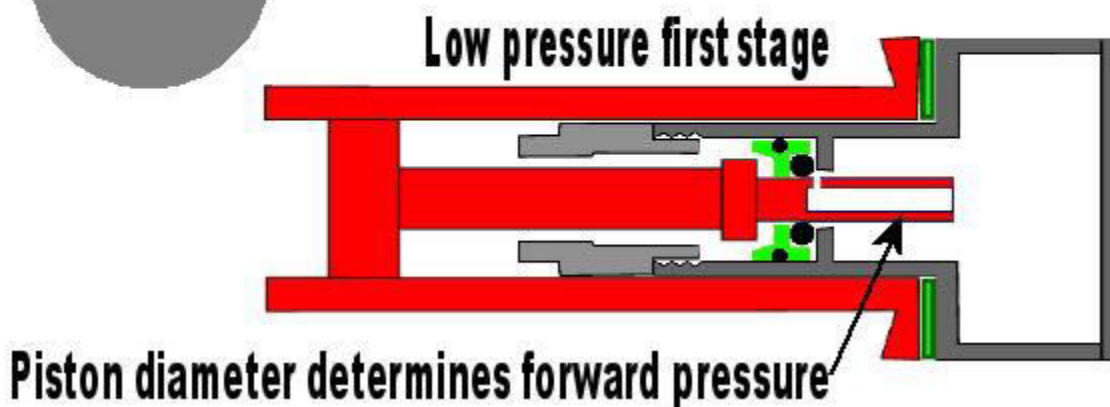
### **How Does it Work?**

Here is a simplistic animation of how the Level 10 mod works. The main spring is eliminated for simplicity.





## LVL 10 Mod Airgun Designs

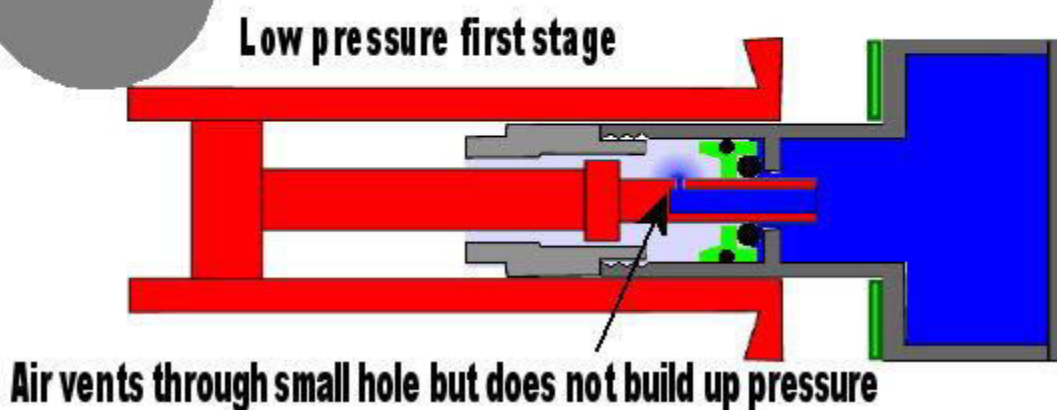


The above image shows the slow speed, low pressure phase of the bolt stroke. It is very slow - about 4-6 FPS (as compared to 20 FPS for the Level 7 valve). This slow speed and low pressure makes sure the bolt will pinch rather than chop a paintball. There is an additional advantage - the slow moving bolt does not crack or bobble the ball waiting to go in.

A smaller diameter (as compared to the level 7) power piston gives the pressurized air within the chamber less area to push against. This, combined with a stronger bolt mainspring gives us the slow initial bolt force & acceleration.

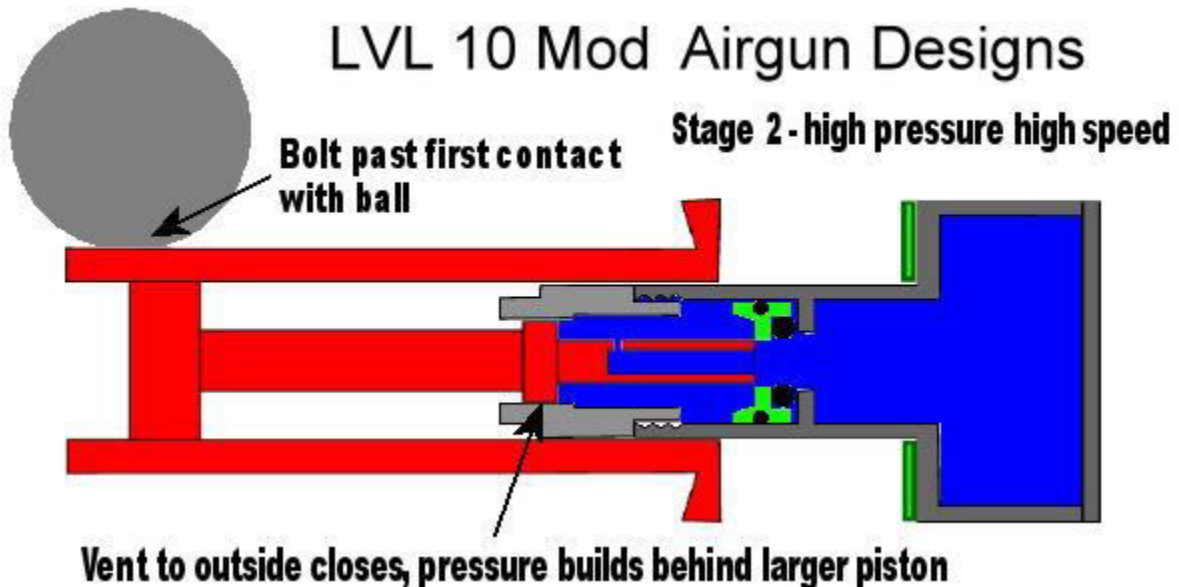


## LVL 10 Mod Airgun Designs



As the bolt starts its initial travel, the small vent hole in the power piston moves past the power tube o-ring. As it does so, the hole begins to vent a small amount of air which leaks out through the power tube tip, as shown in the image below. The amount of air venting is miniscule and has a very minor effect upon gas efficiency.

Why do we have the vent? If a paintball is partially in the breech, the slow moving bolt will stop on the ball, rather than chopping through it. When the bolt stops on the partially fed paintball, the power piston vent allows the pressurized gas in the air chamber to escape. Once enough air pressure escapes, the bolt spring pushes the bolt back and recocks the marker. Also at this time, the paintball drops the rest of the way into the breech and the marker is set to fire once again.



Above we show the second stage of bolt acceleration which starts after the bolt gets past the ball stack. During this acceleration stage, the end of the power piston moves completely past the power tube o-ring. This allows pressurized air to flow into the power tube where it pushes against the larger diameter section in the middle of the power piston. At this point, the bolt accelerates to full speed - approximately 15 FPS. It is at this point where the valve goes to full power - loading the paintball into the barrel, firing, and retracting the bolt.

This second acceleration stage is very important - it allows us to maintain the high firing rate of the marker. If the bolt continued to travel at the same speed it would severely limit the firing rate. The animation at the top does not properly show the speed increase.

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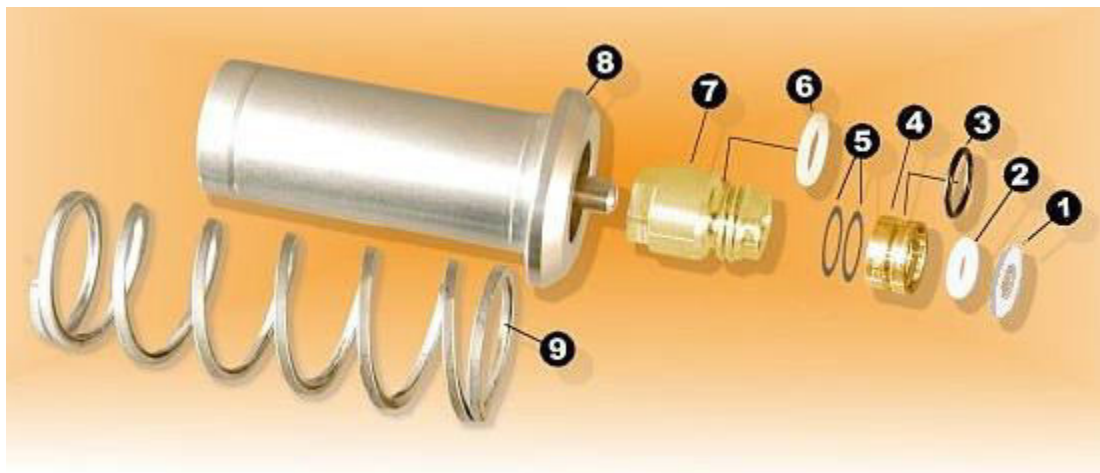
## **Superbolt II Cutaway and Information**

Here is a cutaway showing how the new Superbolt II is lightened . Note that the wall is much thinner now but still has great strength because it's stainless. To see how much was cut away look at the rear end where it gets thicker back to original size. Radiused edges were also added. This all stainless, never wear out version only weighs 8% more than the original Superbolt. It weighs in at 1.16 oz and is in contention for the lightest reciprocating bolt in a paintball gun. That also means less kick!!



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## Fast Start Assembly Instructions



### Parts List:

1. Backing washer
2. Power tube o-ring
3. Carrier O-ring
4. Carrier
5. Shims

6. Power tube O-ring
7. Power tube tip
8. Superbolt
9. Main spring

From experience, AGD has put together these quick set of instructions that should be a good starting point for you to your Level 10 Mod up and running. For more detail instructions, [see below](#).

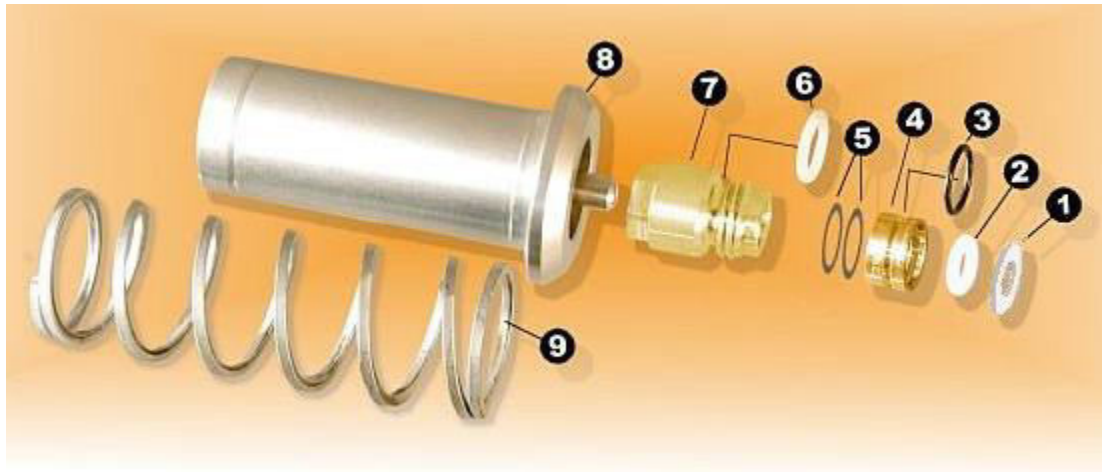
1. Take the guts out of your power tube and put them in a bag along with your old bolt.
2. Install the backing washer (1)
3. find the carrier (4) that has two grooves cut in it and install a power tube O-ring (2) and lightly lubricate the power tube oring and the black carrier O-ring (3)
4. Using the end of a pen cap push the carrier, O-ring first, into the power tube.
5. Drop in TWO shims (5) and make sure they are sitting flat.
6. Holding the valve upright, screw in the power tube tip (7) and tighten.
7. Find the middle length bolt spring (9). This one can be identified because it has one coil cut off the end. Put the end with the coil cut off on the bolt first so the end without the coil cut off is hanging off the end of the bolt.
8. install the bolt on the valve, assemble into the marker and gas up.
9. The marker may or may not be leaking down the barrel. If the marker does not shoot, turn up the velocity until it does so consistently every time you pull the trigger. Fire the marker a few hundred times to wear in the O-ring while you let it leak.
10. Now that you have the O-ring settled in, switch to the next size smaller carrier until the marker stops leaking down the barrel.
11. Set your velocity to 280-300 and you should be good enough to use the marker as is.

This configuration should get you working and out on the field. The next step in fine tuning is to switch to the longest spring and see if you can get the marker firing reliably in the 280-290 fps range with that spring.

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## More Detailed Assembly Instructions



### Parts List:

1. Backing washer
2. Power tube O-ring
3. Carrier O-ring
4. Carrier
5. Shims
6. Power tube O-ring
7. Power tube tip
8. Superbolt
9. Main spring

### How to Install and Setup your LVL 10 Kit - Ver 1.0

**Remove parts** First remove your valve system, unscrew the power tube tip with a coin and take out all the parts from inside the power tube. Put them together with the bolt in a bag and save them. If you ever have problems you can switch back.

#### **Install backing washer**

While referring to the LVL 10 parts diagram, first place the backing washer (1) into the bottom of the power tube. Make sure it's sitting flat on the bottom. Its made from delrin and should go in a little tight and stay there. This washer prevents the new smaller O-ring from getting pushed into the air chamber.

#### **O-ring inside carrier**

Pickup one of the brass O-ring carriers (4) and push a power tube O-ring (2) into the end that does not have a tapered hole. It should not go in one side and either slide in or press into the correct side. There are 5 carriers supplied with your kit, each one is a little bigger than the next. They each have small grooves on the outside to help you tell them apart. The more grooves the larger the carrier.

### **Tune the carrier to the bolt and O-ring**

Each batch of o-rings is a little different than the last. In order to compensate for this we need to find the proper size carrier. The idea is to get a good seal with as little friction as possible. Take the carrier with the O-ring installed and push it O-ring first onto the pin sticking out the back of the bolt. If it pushes on too hard then go to a larger carrier, if it slides freely on the pin then go one smaller. The proper fit should be just snug.

### **Install the O-ring carrier**

Lightly lubricate the black O-ring (3) on the outside of the carrier. Push the carrier, O-ring first, into the power tube. Use the blunt end of a plastic pen to fully seat the carrier into the bottom of the power tube. When looking down into the power tube you should NOT see the white power tube O-ring (2).

### **Install the power tube**

tip Next install the new power tube tip (7) it should already have the power tube tip O-ring installed from the factory (6). These new tips have wrench flats to tighten the tips. DO NOT OVERTIGHTEN!! Notice that we did NOT put in the shims (5) at this time.

### **Test the O-ring carrier**

Now slide on your new Superbolt II with your original main spring (not one of the new ones) then reassemble the valve into the marker. Gas the marker up as see if it leaks. If it does leak use your finger or a squeegee to push the front face of the bolt around while its leaking. If the leak changes tone then it's most likely the wrong O-ring carrier (4) and you have to go to the next one tighter. If it doesn't leak you have the right carrier and can proceed to the next step.

### **Shim adjustments**

Put a squeegee right in front of the bolt and pull the trigger. With very little clearance between the bolt and squeegee you will notice that the bolt comes forward and just stops on the squeegee. Then nothing else happens. Pulling the trigger does nothing to reset the bolt. In order to get the bolt to reset when it pinches a ball, we have to let the air out of the air chamber. The shims (5) control where in the forward stroke the air chamber starts venting. Its works a lot like the spacers in the original Mags. We left them out before so you could tell the difference between a carrier leak and a shim leak.

Remove the power tube tip (7) and drop in two shims (5). Make SURE they are sitting flat in the bottom of the power tube before you screw the power tube tip on otherwise you will bend them up. Bent shims are useless and you will have to buy more. Reassemble the valve system as before using the original main spring and new Superbolt. Now when you air up the marker it should not leak but when you do the squeegee test you will notice that the air starts venting when the Superbolt moves forward. If you keep adding shims eventually the bolt will just leak all the time. For most people two shims work just fine. If you find that when you pinch a ball the marker locks up and does not reset then add another shim.

### **Main spring tuning**

You are almost finished now. You have probably noticed that when you used the original main spring the bolt came forward with less force than usual but still had enough to chop a ball. The pin in the middle of the bolt is called the Power Piston, it acts like a cork to seal the air chamber. Just like a cork,

it's being pushed out by the air pressure but the sear holds it in. When you fire the marker, the bolt is getting pushed out by the air chamber pressure but the mainspring is pushing BACK against the bolt at the same time. The level 10 modification reduces the size of the "cork" so the main spring has an easier time holding it back. If you put a big enough main spring on the bolt and it will not fire at all!!

The last thing to do is find the right main spring that pushes back hard enough on the bolt but not so hard that the marker does not fire. The right main spring will depend on many things such as what velocity you are shooting, what barrel you are using, the size of your paint etc. Start with the longest mainspring (9) from the LVL10 kit, assemble the valve with it and gas the marker up. Try firing, if it doesn't fire, turn up the velocity until it does. Turning up the velocity is normal for Level 10 tuning it does not mean anything is wrong. If the marker starts venting out the back or the velocity is too high when it does start firing then the main spring is too long.

Switch to the next shorter main spring. There are three mainsprings supplied in your kit. For the AO beta testers we have cut one coil off the longest main spring to make a "middle" spring. This spring looks funny on one end like it's missing a coil (cause it is) put that end on the bolt first so the good end is sticking out. In our experience either the longest or the middle main springs make the Level 10 config work on all the markers we have tested. If you need to shoot 250 fps for indoor you need to go back to the original main spring.

### **Fine tuning**

For most people the setup outlined above will make every paintball day a great experience. For those looking to get maximum anti chop with fragile tourney paint we offer the following suggestions. The O-ring friction can be used to additionally slow the bolt down. By going to the next smaller carrier you add an additional layer of protection at the expense of risking bolt stick. You must keep your marker oiled daily to keep it working reliably. The long mainspring can be trimmed to further fine tune the performance. The best performance comes when the marker just starts firing at 270 fps and works reliably at 290 fps.

The penalty for over tuning is the fact that the marker may occasionally refuse to fire. This is because the main spring combined with the power tub O-ring has too much sticktion to let the bolt go forward. Try at your own risk.

That's it! Your new Level 10 marker is ready to go!!