What Can a Regulator Do for Me……?

Q *I hear a lot about regulators and all the advantages they bring. Exactly what does a regulator do?*

A All the regulator itself does is ensure the same air pressure is available for each shot. This means that the power curve - the way the velocity of the pellet varies as the cylinder pressure falls - of an unregulated gun is smoothed out and, should be either a very slight 'hump' or a gentle slope of not more than about 5 or 6 fps from the maximum fill pressure down to whatever pressure the regulator is adjusted to, which for a .177 is usually between about 80 and 100 bar.

KEY POINT 1

All the regulator itself does is ensure the same air pressure is available for each shot.

Q *A 'hump' or a 'gentle slope'? Not a flat line?*

A No regulator can give exactly the same pressure over the whole fill and its output will always drop as the cylinder pressure drops, but far less than if the reg was not in place. If the regulator pressure is properly set, the power curve will be a very nearly flat, but never quite.

Q *Will this make my MV (muzzle velocity) more consistent compared to an unregulated gun?*

A Yes and no. It will make the *average* MV more consistent over the whole cylinder fill, that is to say it will take out the power curve, and all shots from the fill pressure of the cylinder to the set pressure of the regulator potentially have the same velocity. But the regulator itself will <u>not</u> have a measurable effect on shot-to-shot consistency; even with an unregulated gun the difference in air pressure between one shot and the next is very small, usually less than 1 bar, and that's better than most regulators can manage.

If your gun's MV is erratic shot-to-shot, there is something wrong: maybe something is dirty, wrongly lubricated, or has worn or broken parts, or maybe you are using the wrong pellets but fitting a regulator will not fix these things by itself. Of course, they may get fixed, almost by accident, by the installation process and this, I believe, is the main reason a lot of people

believe fitting a regulator cured their erratic MV – perhaps it did, but not in the way they thought.

KEY POINT 3

INSTALLING A REGULATOR WILL NOT CURE SHOT-TO-SHOT INCONSISTENCY

Q In practice, what is the point of a regulator then?

A First it can increase your shot count because the constant pressure can ensure the right amount of air is used for each shot and secondly, it lets you adjust your gun to the best settings for that single air pressure, rather than having to live with a compromise.

Q So how much will this increase my shot count?

A It depends. If you simply install a regulator without changing anything else, it could even reduce your shot count, rather than increasing it. This is because an unregulated gun is set up to deal with the average cylinder pressure, which is much higher than the regulator pressure. So, if you just do a 'drop-in' installation there is now less air pressure on the firing valve which opens faster and closes more slowly so more air is used for each shot. Added to this, if the regulator is inside your air cylinder, it is taking up space and reducing the cylinder's capacity.

Q Are regulators worth fitting at all then?

A If you are just going to push the regulator into the gun and hope for the best, probably not – you might get lucky, but you will probably not see any worthwhile changes to anything, except flattening the power curve.

Q Then why do so many people fit them?

A Because they let you do other things to your gun that let you get the best settings for a single air pressure, rather than having to live with a compromise.

KEY POINT 3

It is not the regulator itself, but the other things the regulator allows you to do to your gun that make the biggest difference.

Q What 'other things' would I have to do?

A As a bare minimum, I would suggest either weakening your hammer spring and/or strengthening your firing valve spring – they don't need to deal with such high pressures now.

Depending on the gun, you may be able to do this by adjustment, or you may need to replace or shorten one of the springs. For the guns I know best, the Air Arms S400/500 series, my routine is to collapse one coil of the hammer spring, open the power adjuster ('venturi') fully, then adjust the tension of the firing valve until I get the power I want. Generally, for a rifle length 'Classic' .177 this should increase the shot count to around 100, and for a carbine to around 70.

The main alternative to adjusting valve or hammer spring tensions is reducing the hammer weight or installing an anti-bounce hammer. But that is beyond the scope of this article.

Q What about enlarging or replacing the transfer port, and the lengthy 'balancing' people talk about?

A Enlarging the transfer port can greatly improve both the shot count and the firing cycle. If a .177 S400 gives around 100 shots after installing a regulator and adjusting the spring tensions, you can expect something like 120 to 130 shots if you enlarge the transfer port to 3.5 mm (no bigger or the pellet may be damaged passing over it). You should also find the gun smoother and quieter to shoot. You can enlarge the port of a .22 to 4.0 mm, but that is the safe limit.

Q So would you say it is essential to enlarge the transfer port?

A In the end, it all depends on what you are trying to achieve, your level of skill, both with fettling and shooting, and also of course what gun you are dealing with. I know people who have gone all the way with a HuMa regulator as described in Mike 'Cloverleaf's' excellent instructions at https://www.huma-air.com/Fitting-instructions and I know several people who have followed the full Robert Lane installation. Done properly, these more elaborate installations will definitely improve the firing cycle and shot count, but it is up to you whether you think they are worth doing – there are diminishing returns here, and it can take a lot of work and sometimes a significant amount of money to produce a very small improvement. As I said, it's up to you.

Q How reliable are regulators?

A Like so many things in the airgun world it seems to depend as much on whether you happen to have a good one as on the make or model. I have known people have really good results from all three of the main after market makes, Lane, HuMa and Altaros, but I've also known people have lots of problems. Often the problems come from the way the reg has been installed, but even so, if you go onto any of the airgun forums you will see a lot of threads about regulator problems – it probably rates second only to pellet selection in requests for technical advice.

Q So, what is your final take on whether to retro-fit a regulator or not?

A If I had a gun with a shot count I considered too low for my purposes, but I liked it in every other way, I would definitely fit a regulator – probably an Altaros. Similarly, if I had a gun with a really rough shot cycle I might fit a reg to try to calm it down. For a gun with a good shot count that is reasonably smooth to shoot, I probably wouldn't bother.

For some people, getting the most theoretically perfect regulator setup possible becomes a technical challenge and an end in itself. And why not? It's their gun and their time money and effort. But if your objectives are about shooting and you want a gun that enables you to shoot tight, consistent groups, rather than to get the maximum possible shot count and the fastest possible lock time, I believe that a big air cylinder is the best regulator there is. It gives most of the advantages of a well installed regulator, but there is nothing to buy, nothing to adjust and nothing to go wrong.