

SCHUSTER ADJUSTABLE GAS CYLINDER LOCK SCREW

By Andrew Hall

It was a crisp and cold winter day when I arrived at Schuster Manufacturing, but I was warmly received by Rich and Matt Schuster. They are a father and son team that designed and manufacture the M1 Garand adjustable gas plug that I was here to see. Rich is a tool and die maker and started this shop in his garage in 1975, then moved to his present location in 1980. He initially machined all types of metal for industry but has now gravitated to firearm-related material for 90% of the shop's work. Most of it is AR-15 specific. His son Matt is nearly finished with his schooling and the required 10,000-hour apprenticeship to be certified as a tool and die maker as well. If some say that American ingenuity, craftsmanship and hard work no longer exist, they have never met these two. The pride in their work was apparent from when I first walked in the door. After getting into high power shooting many years ago, Rich ordered his "one in a lifetime" M1 from the DCM. Since then, he earned his NRA Distinguished Rifleman Badge shooting



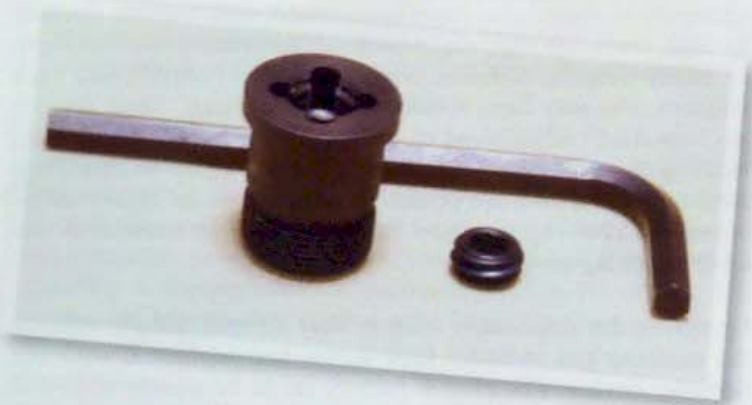
Rich Schuster (l) and his son Matt.

both the M1A and AR-15. Son Matt started in high power as a junior shooter with the M14 and is now rated as an NRA Master, gathering EIC points with an AR-15. Additionally, their proximity to the CMP North Store affords them the opportunity to check on the latest offerings whenever they choose. These guys are shooters and they know what shooters want.

As a relatively new shooter with his DCM M1, Rich learned some specific considerations pertaining to the rifle's gas system. The operating rod was only designed to tolerate a gas port "pressure curve" using a narrow range of bullet weights and powder burn rates. Use of M2 ball, M72 Match, or reloads* replicating those were emphasized. This pressure curve is simply the rate and force of energy applied to the operating rod and connected components over a certain amount of time. It has little to do with peak chamber pressure of the fired cartridge. Typical reloading manuals list bullet/powder combinations that ensure safe peak chamber pressure only. Slow burning powders and/or heavy bullet weights



can be loaded to ensure safe peak chamber pressure but tend to maintain higher pressures throughout the bullet's bore time. The pressure curve for slow burning powder and/or heavier bullets can be significantly different than the pressure curve for military loadings and can create a dangerous port pressure situation for the M1 gas system. If the gas system impulse (force with respect to time) is excessive, it can bend the op rod, as well as cause the bolt to slam the rear of the receiver with enough force to cause cracking of the heel, or worse. Rich studied the gas system and determined that if he simply increased the volume of space after the gas entered the cylinder from the barrel port, the pressure would be lower. What a simple concept! In the photo, you can see that the Schusters have bored out their gas plug to allow for the expansion of the gas. The only problem was that the volume had to be adjustable to accommodate various bullet weights and/or powder burn rates, yet still allow the rifle to function. That problem was solved by the adjustment screw shown.



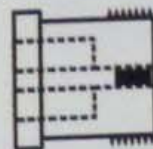
The genesis of the current Schuster Adjustable Gas Plug came from the starting point that the gas plug needed to be Service Rifle competition legal. (Note: this gas plug is NOT legal for John C. Garand "as issued" matches. CMP Rule 6.3.2** covers "as issued" M1 Garands.) The prototype gas plug was an elongated version of the current model that had a volume adjustment screw through the central axis. The Schusters explained that this configuration worked well for bullet weights less than 180 grains but simply did not have enough range of adjustment to allow for any more volume. Not only that, it was not legal for the service rifle category of high power shooting. CMP Rule 6.1.2 ** states that any replaced component must conform to the exterior dimensions of an original component. Further, CMP rule 6.1.2 (4) ** allows for internal modifications

to enhance accuracy. The only way to have it conform to the CMP regulations and allow for more volume was to vent some of the gas out of the rifle. Again, the adjustment screw ran down the central axis of the plug, but now it was designed so that, in addition to an adjustable chamber within the plug, some gas could be vented forward, if needed. This has the effect of a larger gas plug chamber while maintaining the proper external configuration and dimensions that are legal for service rifle matches.

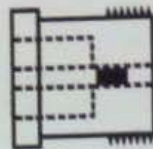


The Schusters also pointed out that when the M1 was invented it had to function reliably in the harshest terrains in the world: hot, cold, sand, mud, water, and fouling. To work reliably in these environments, the rifle was designed to "over function" roughly 10% - 15%. Also, when these rifles were new, all the parts were properly assembled on factory fixtures with new and in-tolerance parts. Of course, the present-day situation has changed, as most rifles have been rebuilt with various fixtures, tooling, parts, springs, etc. Add in all the various combinations of bullet weights, different powders, types of barrels, and even calibers, you may have a rifle unique unto itself. Thus, there is no "standard" adjustment or setting on the Schuster gas plug. Having the plug tuned to your rifle allows you to operate it with the lowest possible operating impulse. All of these reasons combined are why they say that there will be some trial and error or testing involved.

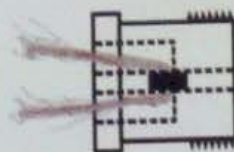
Operating the Adjustable Plug is very simple. Simply remove the existing gas cylinder lock screw and replace it with the Schuster device. The plug is factory set to be mostly open and ready for fine tuning. It is set this way to account for a "worst case" of unknown bullet weight and/or powder combination, such as off-the-shelf hunting ammunition. The rifle should not cycle, with the open factory setting. The process is to tighten the adjustment screw $\frac{1}{4}$ turn at a time until you are able to get the action to fully cycle and then tighten it $\frac{1}{4}$ turn more. Testing revealed that there are $\frac{1}{4}$ turn "clicks" until the adjustment screw has been turned approximately three times towards closed and then it becomes simply smooth but slightly resistant. Firing several rapid-fire strings after the final setting is recommended, to be certain the rifle will reliably function. Be sure to mark the position and install the set screw. That's how simple it is. If you change bullet weights or powder types, the process requires you to loosen the adjustment screw and restart the process.



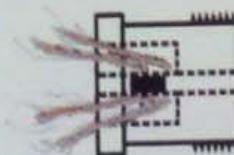
With the plug installed at this position, it is identical to the USGI



In this position you have increased your volume, meaning lower pressure.



At this point you are actually venting a small amount of gas.



Finally you can vent all of the gas and cycle the rifle by hand.

Range Testing

Testing the plug revealed some very important points about adjustment. I intentionally used three separate rifles of mine to test this device and even had a friend from my Marine days (member Carl Jones) test it on one of his rifles to ensure there was a relatively good sampling of test platforms. The M1 rifles that I tested were a match grade .308 with a Douglas heavyweight barrel from Champion's Choice, a standard rifle with a Criterion barrel, and a USGI rebuilt rifle as received from the DCM. Carl's rifle is a .308 match rifle with a Krieger heavy barrel. Each rifle had its own sweet spot for a particular type of ammunition. For example, when testing M118 Special Ball (173 grain bullet), my .308 required about $1\frac{1}{2}$ revolutions of the adjustment screw towards closing, and Carl's rifle about six revolutions. His adjustment screw was even slightly protruding from the flush position (fully closed). This was certainly the most extreme difference I found, but it is a good illustration of possible adjustment ranges. Careful adjustment of the screw is essential for safety because of all the possible variables of rifle components and ammunition.

Possible Uses

1. Commercial Hunting Ammunition

Certainly one of the problems in hunting with the M1 is whether the ammunition used is correct and proper for the rifle. To test this, I purchased a 20-round box of 30-06 commercial hunting ammunition loaded with an unknown powder and a 180 grain soft-point bullet. Since the Schuster device was in the factory open setting, the action did not cycle with the first test round. It only took a total of a half turn (two clicks) to get the rifle's action to cycle reliably. I also had my chronograph on hand and I determined that this particular round averaged 2800 fps. Those were numbers I was not used to seeing for a bullet close to this weight coming out of an M1! I would never fire this type of round out of one of my M1's without the Schuster plug. The best part is that this ammunition shot very accurately out of my rifle.

2. Use of Slower Burning Powders and/or Bullets in Excess of 175 Grains

Bullet weights in excess of 200 grains are possible through the use of a powder in the proper pressure curve, such as IMR-4895. Consider also that one may use a slower burning powder, such as IMR-4350, with a bullet weight in a more normal range of 150-175 grains. The use of a heavy bullet combined with a slower powder, such as IMR-4350 with a 190 grain bullet, starts to push the operating range of the Schuster plug and should be cautiously approached.

When GCA Director Jim Adell was a member of the U.S. Navy team, they experimented with firing the 190 grain Sierra Match King out of their M1's. The 168 grain Sierra Match King would go subsonic by 1000 yards and the Navy was looking for an alternative that would not. Jim said that the accuracy and performance of the 190's was great, but they were bending the op rods in fewer than 500 rounds. This of course was before the production of the 175 grain Sierra Match King, which remains supersonic at 1000 yards.

I had some slower burning powder (Winchester 760) that I normally would not use in an M1 and have been loading with it with 150 grain FMJ bullets for my M1903 Springfield. Ball powder like this throws accurately compared to extruded powders like IMR-4895. I easily found the sweet spot after about two turns in from the factory setting and was happily firing away with what was previously considered unsuitable powder. The recoil is much better on the M1 compared to the M1903, so maybe I will finish up the rest of the can on the M1.

3. Accuracy Enhancement

Rich and Matt explained that they had good success on accuracy enhancement with some M1's by fine tuning the "op rod and barrel harmonics" of certain rifles. This was accomplished by utilizing 1/8-turn adjustments from a known reliable cycling position. They were quick to point out though that a rifle that shoots poorly cannot be made into a tack driver by simply installing their device. To test this, I used my match grade M1 chambered in .308. This rifle shoots well with 168 grain Sierra Match Kings but not with 173 grain M118 Special Ball. Carl Jones also had the same problem with his .308 match rifle. We each took our rifles to see if we could get any improvements. The 300-yard prone rapid fire is where we would really start to get hurt with points, so that became the agreed-upon test distance. Our results indicated some minor accuracy enhancements, but the most important thing is that we did not have any accuracy degradation. I also found slight improvement with the 168 grain load I was using.



Left: Standard screw, right: Schuster adjustable screw

4. Minimizing Wear and Tear and Brass Placement

Another possible benefit is that if you use just enough impulse to properly cycle the action, the service life of the op rod and other components can be greatly extended. I fired standard M2 ball out of both of my standard M1's. One of them has a Criterion barrel, and the other is barreled USGI. I found that the Schuster plug adjustment was very similar on both rifles at around only 2½ revolutions towards closed from the factory setting. I expected that I would have had the adjustment screw nearly flush, replicating the original gas volume with a standard gas cylinder lock screw. Range testing proved otherwise.

Additionally, the Schuster Plug is an excellent tool to adjust where ejected brass is thrown. M1's in .308 are notorious for ejecting hot brass at three to four o'clock, which the shooter to your right certainly does not like. Even standard M1's will sometimes do this. My .308 is no exception, and careful adjustment of the gas plug allowed the rifle to eject brass at the one to two o'clock position and not too far from the shooter. The adjustment for this took as little as 1/8-turn from a known reliable cycling position. This is the third method I know to control the placement of fired brass. Readers may recall GCA Director Walt Kuleck wrote in his article on assembling a .308 M1 in the Summer 2006 *GCA Journal* that you can shorten the length of the ejector spring. Member Jim Swartz recommended reshaping the ejector face as an alternative in the Fall 2006 *GCA Journal*.



Both poppet and single slot configurations are offered, but that is cosmetic and does not affect operation. The face of the poppet type is slightly thicker.

Single Shot Rifle

Some shooters may like to shoot their rifles and not track down the brass after firing. By simply opening up the Schuster plug all the way and allowing the gasses to vent forward out of the gas cylinder, you effectively have a single shot, straight-pull bolt rifle in which reloading is accomplished by manually cycling the action. The empty cartridge case then ejects nearby for easy recovery.

Conclusion

This is an excellent piece of equipment that allows greater flexibility in using the M1 rifle than previously. Readers might enjoy the excellent article by John Clarke in the March 1986 *American Rifleman* covering reloading for the M1 rifle. It is an excellent resource for understanding the relationship of bullet weights, powder types, and reloading techniques that are possible. As with anything in shooting sports, a measured, informed, and judicious plan will ensure a positive outcome.

** The GCA does not endorse any specific reloads or reloading techniques, nor does it endorse commercial products. All information in this article is solely the opinion of the author.*

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