KNS AK Adjustable Gas Piston FAQ

This document is a result of designing, manufacturing, improving, and integrating the KNS AK adjustable gas piston system for a number of years now and is intended to help answer some of the common and not so common questions we've encountered during this time.

Q1: "What does the KNS piston actually do?"

A: The short answer is - the KNS piston allows a user-definable amount of gas to bypass through the piston itself to reduce bolt carrier velocity.

Generally speaking - most AK are "overgassed" - meaning the gas system is tuned to have excessive energy available to drive the bolt carrier group. There are some valid reasons for this, and some not so valid reasons in excessive cases. The piston is designed so that pressurized gas inside the gas block can enter through the face of the piston, and be vented behind it. There is an detented adjustment collar that is used to vary the amount of gas that is bypassed, allowing the user to tune the energy used to drive the bolt carrier.

The result is that the bolt carrier does not strike the rear trunnion with excessive force, recoil is reduced, and in some cases - a wider range of ammunition types can be safely used. When using a sound suppressor - the weapon can be tuned so the added backpressure/dwell time does not negatively effect the performance of the weapon.

For the handful of customers with extremely valuable transferrable machine-guns - tuning the gas system can help extend the lifespan of these irreplaceable firearms.

All of this is accomplished without the need to remove the gas block or change the weapon's outward appearance.

Q2: "Which piston kit do I need for my AK?"

A: This is probably the most common question we get, many times with little to no context. Even with the correct manufacturer and model number information - there is no guarantee that the listed kit will fit correctly as the firearm may have been previously modified or even assembled in a layout not consistent with a factory-built example.

This is a long-winded way of saying - "the best way to ensure you order the correct kit is to measure your current piston correctly". With accurate measurements, it is much easier to identify and choose the correct kit the first time, even if the firearm differs from the typical layout for a given make/model.

Q3: “How do I measure my current/factory piston?”

A: The best, most accurate way of measuring the piston currently installed in your firearm is an inexpensive set of digital calipers. They can be purchased on-line and in most auto-parts stores for around $20. We are not concerned with fourth-decimal place numbers here, so even an inexpensive set will allow you to obtain the information needed.

The two most important lengths we are looking for are what we call “working length” and “hole distance”. “Working length” is the distance from the face of the piston, to the seam between the piston shoulder and the front nose of the bolt carrier. “Hole distance” is the length between the seam of the piston shoulder/front nose of the bolt carrier to the center of the rivet that prevents the piston from unscrewing from the carrier.

By accurately measuring these two lengths - the majority of ordering errors can be avoided - even if the firearm is configured in an unusual condition.

Q4: “Small bore vs. Large bore - what does that mean?”

A: We get the question a lot whether or not there is a length and/or head diameter difference between the small and large bore piston heads.

There is NO difference in the length or diameter between large and small bore - the difference is in the gas passages only. The large bore has slightly more internal volume at rest, and can flow more gas than the small bore - think of it as a “high” and “Low” selector on a transfer case.

The large bore piston heads are generally used on .30 caliber firearms, while the small bore pistons are generally used on .22/5.45/6.5 bore firearms.

Of course, the answer is not always that simple - there are plenty of times when a small bore piston may be used on a .30 caliber firearm to make up for a short dwell time. A perfect example of this would be an Arsenal 107CR - which as a full length gas system, but almost no barrel length past the gas port. This results in a very short, violent gas pressure impulse. Since the large bore piston has greater internal volume at rest, it is common for the firearm to “short stroke” even with the piston fully closed and muzzle booster installed. To counter this - a small bore head is used to push the adjustment band into a usable range - despite the natural tendency to use a large bore piston with a .30 bore.

Conversely - there may be times that a large bore piston may be used in a .22/5.45 bore firearm to correct a drastically overgassed situation, especially when combined with a sound suppressor and related additional backpressure.

Q5: “What are those triangular-shaped ‘Star Guides’ for?”

A: There are two typical ways of stabilizing and guiding the gas piston once it has left the gas block during the cycling process of the firearm.

The first and most common is a fluted gas tube - which provides linear rails to center the gas piston throughout it’s movement during cycling. This method does not require the piston to have any stabilization feature of it’s own and is typical for most AKs/ variants.

The second method is commonly seen on Galil or Galil-derived variants, as well as some Yugoslavian designs. This method involves a smooth/round gas tube and moving the centering feature onto the gas piston/op-rod itself.

The op-rods that KNS manufactures that are meant for firearms that may have this second method of piston guidance, as well as ALL Galil variants - have a provision to duplicate this feature in the form of that triangle-shaped component. There are a few different sizes of Star Guides, some for different models, some for different variants of the same model in the case of the Galil series.

There is even a “dummy collar” for firearm models like the M92 that can have either version of the gas tube. The dummy collar is used to form a clean profile of the op-rod in cases where the gas tube is fluted and the Star Guide is not used.

Q6: “How difficult is it to install a KNS piston?”

A: Typically, an installation takes less than 30 minutes including tool cleanup. Most AK gas pistons are threaded into the bolt carrier, then crossdrilled, then flush-riveted to prevent it from unscrewing from the carrier. In most cases, this rivet can be driven out with a couple of punches, hammer, and a good vise.

Occasionally there will be a rivet that just does not want to be driven out, and the best route is to partially drill the rivet to relieve it and allow it to be driven out the rest of the way - or drilled out completely.

Of course there are always exceptions - take the Saiga and VEPR series for example, these pistons are not riveted, but rather “pinch crimped”. This is a process where the nose of the carrier over the piston threads is “pinched” between two points, and material is physically displaced into the piston threads - much like gas key staking on an AR15. In this case, there is no rivet to drill or drive out - instead, you must drill out the crimped area to remove the material that has been displaced. This process of crimping is also less consistent in it’s location - which is why the KNS op-rods for these models are not pre-drilled. They must be hand fitted each time - so the cross hole is omitted during manufacturing.

There are also other manufacturers that instead of riveting or crimping - will actually weld the piston to the carrier. This results in a situation where the carrier is destroyed if the piston is removed - believe us, we certainly tried to find a way to rescue these - and it just doesn't work. Do not try to remove these pistons, instead - purchase an appropriate replacement carrier and install the KNS piston.

The Galil classic and ACE series, as well as the Finnish Valmet series are secured from the factory with a spring pin rather than a rivet or crimp - which makes them the easiest to install. Simply drive out the spring pin and unscrew the piston, set these aside in to preserve the value of the original parts - and install the KNS piston assembly per user manual.

There is always the option of sending in your bolt carrier/piston to KNS to have us install it for you. The price of this service is $35 and return shipping.

Q7: "Why does the spring pin not extend through both sides of the bolt carrier rivet hole"

A: This is very much intentional, and has to do with manufacturing tolerances regarding the centering of the rivet hole. While rare, we have seen rivet holes in the carrier drilled so far off center - that there would be no way for a pin to extend through both sides - and line up with the matching cross hole in the KNS op-rod - which is very much on centerline.

The only job of the spring pin is to prevent rotation of the op-rod once installed, the threads carry the actual physical load during cycling. Having the pin only engage one side of the carrier allows the KNS piston to be successfully installed - even when the bolt carrier rivet hole has been drilled of-center.

Q8: "Why is there play or 'wiggle' between the KNS op-rod and/or piston head?"

A: Most AKs do have some play in the threaded joint between the gas piston and the nose of the bolt carrier. This is to allow the piston to reliably find it's way back into the gas block even if the alignment of the barrel/receiver components is not perfect.

Some AKs have less or no play - in either case, it is nothing to be concerned about. The KNS piston assembly also has a small amount of play between the piston head and the op-rod. This is intentional - again, to help the assembly self-align during operation.

Q9: "Why is the supplied spring pin smaller in diameter than the cross hole in the bolt carrier?"

A: Not only is the supplied spring pin smaller in diameter than the bolt carrier cross hole, there are also two cross holes in the op-rod as well. This is to allow the greatest chance of installing the piston assembly to the identical length of your original piston.

The slightly smaller pin and the cross holes 90° from each other means that finding the “sweet spot” is easy despite many manufacturing variables.

Q10: “The Micro Galil and Mini-Draco pistons look different - why is that?”

A: They do look different, but the Micro Galil and Mini-Draco pistons still operate on the same principal as their full-size counterparts. The difference is how the adjustment collar works - as the size constraints of these platforms forced a rearrangement of this feature.

Instead of the adjustment collar moving “up and down” when rotated - opening or closing off the vent port - the micro piston collar spins around its center axis only. The adjustment method is a result of the port vent port shape combined with a helical “ramp” on the adjustment collar. As the collar is rotated throughout it’s detented positions, the side vent is opened by varying amounts.

You will also notice that these pistons have removable inserts in the face of the piston. On the Galil version - there are two orifice sizes to accommodate different cartridges/ bore diameters, much like the “smallbore” and “largebore” piston versions.

The Mini-Draco has an insert with gas ports placed radially - this is due to the gas block design on this weapon and the resulting gas flow inside the block during pressurization - and is unique to the Mini-Draco.

Installation methods are the same as compared to their full size host weapons. The Mini-Draco being the riveted type, and the Micro Galil being of the spring pin type.

Q11: “What are the differences between full size AK pistons and Galil pistons?”

A11: For whatever reason, the classic Galil and the Galil Ace firearms have gas pistons a couple thousandths larger in diameter as compared a typical AKM piston. Our Galil pistons are sized accordingly to reproduce this diameter so that the gas seal replicates the factory performance.

To allow quick, positive visual identification - the turbulence grooves around the piston head are spaced asymmetrically compared to the symmetric spacing of the AKM piston head. The internal passages are identical to their AKM equivalents.

Occasionally, Galil pistons heads may be used in non-Galil applications where a tighter seal is required to get the weapon to cycle correctly. Examples of this include a gas block with oversized piston ID journal, or a firearm with a full size gas system but very little dwell time. A good example of this would be an Arsenal 107CR. Care must be taken to verify that the larger Galil-sized piston head moves freely in the gas block.

Q12: “Why do the original production PSL’s use the “large bore” piston head, while the new production (2018 and on) PSL’s use the “small bore piston head?”

A: It seems as though when production of the PSL was restarted, the gas port was adjusted to be a little smaller than the original production version. This is a welcome change as the original PSL was severely overgassed. The small bore piston provides a proper range of adjustment for the new production guns.

Q13: “I installed the KNS piston system into my firearm and now it won’t work/won’t cycle - what’s the deal?”

A: This is a short question with a long series of answers. One thing to remember throughout all of this is that for the most part, the KNS piston assembly can only *REMOVE* energy. In most cases, the KNS piston assembly has slightly more mass than the factory unit it replaces. The port in the face of the piston, whether it’s a small or large bore - means there’s additional start volume within the gas block. Even a fully closed adjustment collar will leak *some* gas. The small bore insert of the micro Galil piston head actually protrudes into the gas block a little bit - this is an example of displacing starting volume in order to make up additional mass/gas leakage/etc.

First of all, was the weapon overgassed in the first place? More and more AK/Galil style firearms are being manufactured by modern factories across the US and the rest of the world and in some cases - the TPD is being revised based on years of data. This means that some newly manufactured firearms may not be as overgassed, or overgassed at all, more manufacturers are building their firearms with suppressor use in-mind.

It is important to test fire your newly acquired firearm in the configuration(s) you intend to operated it, and gauge the ejection pattern/strength. Test it with and without the suppressor/muzzle device(s), and ammunition types you intend to use. Do these combinations work? If so - what is the ejection pattern like? If the cases are not being ejected more than 15-20 feet, you have a firearm that is gassed well and doesn’t need to be “repaired”. Taking away energy may make it unreliable, especially if you desire to use subsonic ammunition - which may not work in the host gun at all without further modification.

Another consideration that is touched on in Q11 is “dwell time” - which is the amount of time the gas system of a gas-operated weapon is pressurized. Meaning - the amount of time between when the bullet passes the gas port, but before it exits the muzzle. When looking at a configuration like a SLR-107UR, where it has a full-length gas system, but the muzzle terminates VERY shortly after the gas block - that is a situation where the dwell time is very short. A large volume of gas must be passed through the port in the short amount of time available in order to impart enough energy to fully cycle the bolt group. If a firearm like that is already gassed close to correctly, removing further energy may be enough to make it perform unreliable in some situations.

When looking at a “Krinkov” style firearm, the factory configuration includes a large muzzle device with significant internal volume, this “booster” retains a volume of pressurized muzzle gasses and the result is an increase in dwell time - which helps weapons in this configuration cycle more reliably. If the firearm was gassed with the expectation that this muzzle device be present - removing it can upset the balance more than you think. An example would be removing the factory muzzle booster in order to install a QD suppressor mount. Because a sound suppressor acts as a booster, as long as the suppressor is installed - there should be sufficient dwell time to function the firearm. Once the suppressor is removed, so is that extra dwell time and you run the risk of under gassing the firearm.

There are even certain firearms that exasperate this issue by recessing the muzzle into the gas block/front sight component. An example of this is the Yugo M85 - this firearm has even less precious dwell time than would appear as the muzzle terminates *before* the end of the GB/FSB.

<u>From a builder’s perspective:</u>

When building an AK/Galil type firearm, whether at home or by a commercial operation - if the intent is to cycle all types of ammunition, with and without a suppressor - you must take care to sufficiently gas the firearm for the lowest energy configuration with the KNS piston fully closed.

This means the gas port must be of sufficient size so that it will cycle the lowest-power ammunition type desired, with NO muzzle device present, in cold weather. Once that condition is met, the KNS piston is used to bypass surplus energy caused by higher pressure ammunition, muzzle devices, and weather conditions. This is even more important if subsonic ammunition is desired, although with that ammunition type - the ability to cycle without a suppressor is generally irrelevant.

Of course, if you are paying attention - you would say: “But why would you intentionally overgass a brand new gun just to use an after market part like the KNS piston to fix it?”

The reason is: the intent is to use the KNS piston system - we can afford to give the weapon plenty of power down low with range-quality ammo in the cold without a suppressor - because we have the ability to easily modulate the gas without tools as needed via the piston.

By intentionally overgassing the weapon slightly and installing the piston from the start - we have the ability to run the entire range of configurations. This will GREATLY improve the ability to run subsonic ammunition types as well, although in some cases - even further modifications are required to reliably run low-pressure loads (lighter recoil springs, lower-mass carrier, more complex gas systems)