

ComGraf Pump Action Rifle Kit Assembly Instructions

(Revision 3/17/2019)

This set of assembly instructions should allow you to install and test your recently purchased Pump Action Rifle Kit. There is a bit of trial and error in the fit-up as every situation is slightly different, so allow sufficient time and take it slowly. If you would prefer ComGraf assemble your pump action upper assembly or you have a non-standard barrel that will require some level of gunsmithing to complete, please contact us at 203-215-2031 to discuss the scope and any additional charges for the work. This will require that you ship us your complete upper assembly, either in pieces or together.

Tools Required:

- AR-15 Upper Receiver Action block (e.g., Brownell's Part # 080-000-659WB)
- Armorer's wrench (e.g., Brownell's Part #851-000-068WB) or barrel wrench
- Snap ring pliers (optional; required only if snap ring is used)
- Small hammer
- 1/8" rat tail file (optional)
- 3 mm Allen wrench (Supplied in Kit)
- 3/32" Allen wrench
- 5/64" Allen wrench
- Wood or plastic tap block

Inventory Parts included with Kit:

- Full-length Picatinny rail guide
- Modified bolt carrier key
- Rear guide support and cover
- Turnbuckle nut
- Hand grip
- Modified gas block
- Qty = 2 Low Head Socket Head Cap Screws, 4-40 x 1/2"
- Qty = 1 Low Profile Socket Head Cap Screw, 10-32 x 3/8"
- Qty = 1 10-32 x 5/16" Stainless Steel Set Screw
- Qty = 1 8-32 x 1/4" Black Oxide Coated Steel Set Screw
- Qty = 1 Tube of Loctite 222 thread locker for small screws

User must have or buy a rifle-length gas tube HBAR format barrel with a 0.75" dia. gas block interface. The kit also assumes availability of a standard barrel nut (e.g. Brownell's Part #231-000-360WB) from the original build.



Key

1. Full-length Picatinny rail guide
2. Modified bolt carrier key
3. Rear guide support and cover
4. Turnbuckle nut
5. Hand grip
6. Modified gas block

A standard barrel nut (e.g., Brownell's Part # 231-000-360WB) must be supplied separately. And finally, as noted in the figure above, this kit is designed to work with a rifle-length (gas-tube length) HBAR format barrel of any overall length including a 0.75" diameter gas block section. Note: within the HBAR format barrel group, barrel diameters vary. At the time of your order, we will contact you to determine the diameter of the barrel you plan to use and manufacture a hand grip with the appropriate hole diameter to slide freely on your barrel without too much slop.

Step 1

Once you have completed your inspection of the delivered components and are ready to proceed, the first step is to fully disassemble the upper receiver assembly of your existing AR-15 platform rifle. Note that it is not necessary to remove the forward assist or the ejection port cover. The charging handle assembly is removed during disassembly, but should be reused with the pump action conversion kit to maintain proper guidance of the bolt carrier group (BCG) inside the upper receiver.

Recommendation: Set aside and save your hand guard, gas tube and gas block for use in the future should you wish to switch back to a direct impingement semiautomatic rifle configuration.

Step 2

Remove the existing bolt carrier key from your BCG and replace it with the modified bolt carrier key and push rod assembly delivered with the kit. Use the same socket head set screws for this reinstallation.

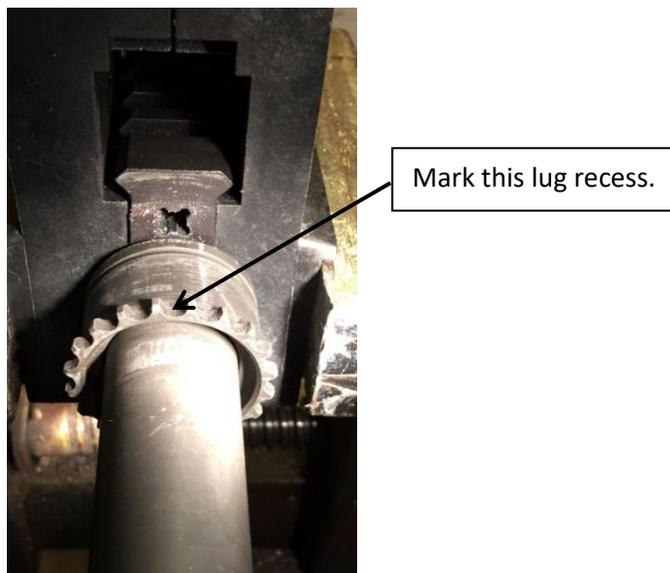
While it is very important to the proper long-term functioning of your AR that the socket head screws securing the bolt carrier key to the BCG be staked properly to ensure they do not loosen over time, we suggest you defer this step until you have test fired your new assembly and know it works to your satisfaction. A good YouTube video of this process is available at:

<https://www.youtube.com/watch?v=toRYkGDoTNk>. You can also do a quick QC inspection of your work based on guidance from this second video: <https://www.youtube.com/watch?v=A2-Qp7MFBI0>.

Recommendation: Set aside and save your bolt carrier key for use in the future should you wish to switch back to a direct impingement semiautomatic rifle configuration.

Step 3

The next step is to test fit the barrel nut on the barrel to determine which of the recesses/lugs in the drive ring of the barrel nut will eventually align with the gas tube through-hole in the upper receiver. To do this, mount the upper receiver in your Upper Receiver Action Block and secure it in a bench vise. Load the barrel into the upper receiver and install the barrel nut, torquing it to specification and carefully aligning one lug recess with the gas tube opening. (Nate Shultz, in his article, "How to Build an AR-15 Upper Receiver – Barrel," <https://thearmsguide.com/5758/build-ar-15-upper-receiver-barrel/>, advises, "Liberally apply AeroShell 33MS grease to both the threads of the barrel nut and the upper receiver, slide the barrel nut over the barrel, and hand tighten the nut. Using the torque wrench and barrel nut wrench, torque the barrel nut to 30 foot-pounds." He goes on to say, "More than likely, exactly 30 foot-pounds will not allow for proper gas tube alignment with the barrel nut, so I typically 'season the threads' by tightening, loosening and re-tightening the barrel nut a few times.") Before removing the nut, mark this lug with some type of pencil. For this demo, an orange colored pencil that contrasts well with the black oxide was used. This marking step is important in helping you properly align the snap ring opening so the push rod will pass through the sub-assembly later.



The following picture of the barrel nut shows how it was marked for this demo.



A little background on the kit is needed before the next two recommendations. We use 3/16" diameter stainless steel for the push rod. Typical tolerances on these rods is +/- 0.001", so they measure 0.1865" to 0.1885" diameter. The gas tube they are replacing measures approximately 0.180" and obviously does not slide back and forth, so clearances where the gas tube passes the barrel nut and goes through the forward end of the upper receiver can be almost zero. This doesn't work well for a sliding rod. We could have the rods we use centerless ground smaller, but rod buckling is a very strong function of diameter and we'd like to maintain all the strength/stiffness we can for this key component. As a result, there may be some binding on the push rod that affects the ease of cycling the bolt.

To ensure the push rod slides without any obstruction through the identified lug in the barrel nut after assembly, we suggest you slightly enlarge the lug opening and the create a small groove in the barrel nut body using an 1/8" rat tail file. It doesn't take much and is somewhat dependent on the manufacturing tolerances used on the barrel nut.

In the same spirit, you may also wish to slightly enlarge the gas tube clearance hole in the front end of the upper receiver. A #7 drill (0.201") works well.

Now bring the two pieces (aft support and barrel nut) together as shown below and slide them over the barrel. Note: there is a snap ring groove on the aft end of the barrel nut, important for a standard hand guard spring retention mechanism, but not really required here. Omitting a snap ring from this installation only makes the final assembly and creation of a clearance path for the push rod much easier.



When this sub-assembly is in place on the barrel, re-torque the barrel nut as described earlier such that the marked lug recess is properly aligned with the gas tube hole.

Step 4

Remove the upper receiver assembly from the vise and the Action Block and install the BCG with push rod into the upper receiver. If your alignment of the barrel nut to the gas tube hole is correct, it should easily slide through. Note that the charging handle is pre-assembled around the BCG. While the charging handle is no longer needed to retract the BCG, it is still important for guiding the bolt carrier key and preventing any twist of the BCG inside the upper receiver.

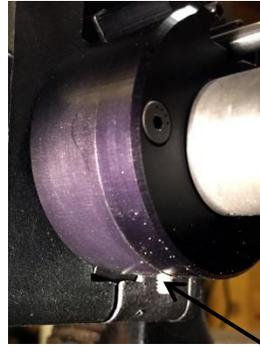


Once the BCG is installed, cycle it a few times to ensure it moves freely. The BCG should be lubricated as normal for ease of movement inside the upper receiver and you may include a light film to the push rod in case there is any incidental contact. If all is well, remount the upper receiver assembly in the Action Block and load both back into the bench vise. The push rod should be aligned parallel with the barrel center and look something like what is shown in the photo above right.

Step 5

Mount the guide support cover over the barrel and use the two 4-40 x 1/2" low profile SHCSs to secure it in place. Tighten the screws just sufficient to bring the cover into close contact with the rear guide support. These screws are designed to fit through lug recesses in the barrel nut at the 9:00 and 3:00 o'clock positions, but they are not a tight fit, so there is some small rotary play in the guide and cover. To address this, you must install the 8-32 x 1/4" set screw provided with the kit into the threaded hole at the 6:00 o'clock position of the rear guide support. Carefully align the top of the rear guide support and cover with the flat top of the upper receiver and tighten the set screw to maintain the alignment.

4-40 x 1/2" SHCS screws



8-32 x 1/4" set screw

Optional

The kit is provided with a small tube of Loctite 222 thread locker. This is a low strength adhesive designed for small diameter screws. It is intended to prevent screws from loosening under vibration, but still allow them to be easily removed with hand tools. Depending on how often you intend to check screws for tightness or disassemble this pump action mechanism, you may choose to apply one small drop to the threads on each of these three fasteners.

Step 6

Slide the pump hand grip onto the barrel with the threaded screw section pointed toward the upper receiver. Then join the push rod and the hand grip together using the turnbuckle nut. This nut has a left-hand threaded end and a right-hand threaded end. The LH threads are meant to receive the threaded end of the push rod; the RH threads are meant to receive the threaded screw attached to the hand grip. Note that the threads on the push rod are slightly longer than those on the hand grip screw. This is intentional. You should first thread the turnbuckle nut onto the push rod, advancing it 1-2 turns. Then engage the hand grip screw threads and draw the two components together by continuing to turn the nut. You will need to use a small tool such as one of the Allen wrenches placed carefully through the center transverse hole in the nut to overcome thread friction. Continue to tighten the nut until the hand grip threads are fully engaged and the nut is snug against the unthreaded portion of that screw. You should hold the hand grip from turning to avoid putting any undue stress on either component as the nut is tightened. The screw in the hand grip is epoxy bonded and double-pinned, so it should remain secure for long service. The joint is designed primarily for axial loading, not to resist excessive torque. Don't over tighten the turnbuckle nut.

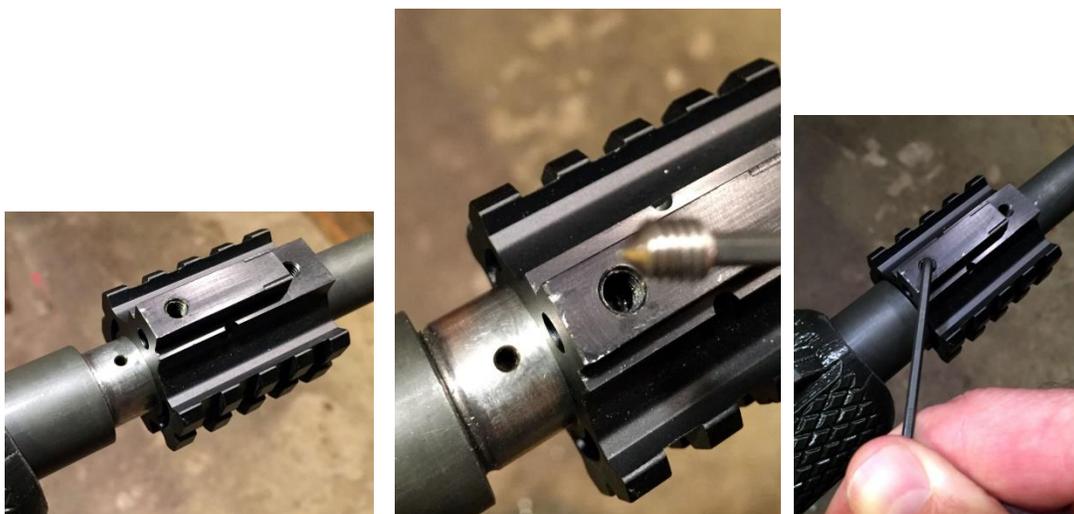


Optional

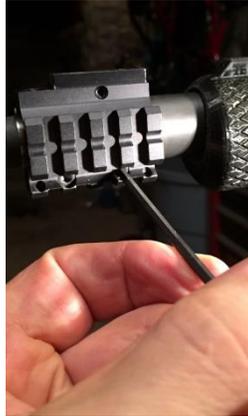
Depending on how often you intend to disassemble this pump action mechanism, you may choose to apply one small drop to the threads on the RH screw extending out of the hand grip. Do not apply thread locker to the threads on the pushrod to avoid any excessive torque on the push rod during disassembly.

Step 7

Mount the modified gas block onto the barrel as shown in the photo below and then install the 10-32 x 5/16" stainless steel set screw into the threaded hole on the top of the gas block. As the set screw nears the bottom of the threaded hole, but before it makes contact with the barrel, reposition the gas block so the set screw will engage the gas port in the top of your barrel. This serves two functions. First, it blocks the flow of gas out of the barrel. Second, it very accurately aligns the gas block, both axially and rotationally. This is especially important if you later choose to mount a front sight to the Picatinny rail on top of the guide rail. Torque this set screw to 15-20 in-lbs.



The gas block is next further secured to the barrel using two clamping screws (already partially installed) in the side of the gas block near the bottom edge. Use the 3 mm Allen wrench provided with this kit to tighten these screws to approximately 15 inch-pounds.



At the conclusion of this step, the unfinished assembly should look like this:



Optional

Depending on how often you intend to check screws for tightness or disassemble this pump action mechanism, you may choose to apply one small drop to the threads on each of the four fasteners used in the modified gas block. Loctite 222 is rated to 300°F and is considered suitable for use on the stainless steel set screw which is used to block the gas port in the barrel. Be careful you do not use an excessive amount such that some leaks into the barrel and solidifies on the rifling. If you use this thread locker on the 10-32 x 5/16 set screw, inspect your barrel ID after assembly to ensure nothing has leaked onto the rifling.

Step 8

The last step in the assembly process is to mount the full-length Picatinny rail guide. The attachment of this guide makes use of the two spring pins protruding from the front of the rear guide support assembly and a SHCS that secures the front end to the gas block. The photo on the left below illustrates the two holes intended for engagement with the spring pins at the rear end of the barrel. The photo on the right shows the slot through which the SHCS passes.



Lay the guide rail on top of the hand grip, Picatinny rail side up, propped up at a slight angle toward the front end of the barrel, and align the two holes in the aft end of the guide rail with the two spring pins in the rear guide support. Then, using a block of wood or a thick piece of plastic to protect the front end of the guide rail, use a small hammer to lightly tap the guide rail onto the two spring pins. This assembly tolerates a small amount of vertical misalignment which is necessary for the guide rail to clear the top of the gas block and settle down onto it at the end of the insertion. There should be no appreciable gap between the aft end of the guide rail and the front of the rear guide support when you are finished. Use the 10-32 x 3/8" Low Profile SHCS provided to secure the guide rail to the top of the gas block. Note that you will be using the same threaded hole used earlier to install the stainless steel set screw that blocks the gas port in the barrel. Tighten carefully (not to full screw specifications). The screw head is bearing against the aluminum surface without an intermediate washer. The screw should be tight enough to avoid vibrating loose, but don't overdo it.

Optional: you may apply a drop of Loctite 222 to the 10-32 x 3/8 LP SHCS.

This gap is supposed to exist.



There should not be a gap here.



Wrap Up

Reinstall your flash suppressor, add sights, etc. to finish up. (I have intentionally omitted a crush washer from the installation of the suppressor shown in the photo below, but just for the photograph.) Once you are comfortable that your converted AR is working properly, be sure to reinstall the flash suppressor properly (with a new washer).



Good luck and enjoy. If you need help or have suggestions, please call for support: 203-215-2031.

