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EDITION

PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

10

ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

P.08 LUGER INSPECTION AND REPAIR

PHASE POWER PRIMER • BATFE GUNSMITH RULES • WINCHESTER WILDCAT • SHOTGUN SHOUT-OUT AND XS MAGAZINE ...

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 214

DIGITAL ARCHIVE EDITION

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MACHINING

Phase Power Primer

BY AMERICAN GUNSMITH EDITORS OCTOBER 2021

ORIGINAL PP. 2

American Rotary (AmericanRotary.com), is a Wisconsin-based company making rotary phase converters since 1991. Here are there tips to make the most of your shop machining equipment. Phase here refers to the distribution of a load. Single-phase power is a two-wire alternating current with one phase wire and one neutral wire, with current flowing between them. Three-phase power is a three-wire AC power circuit with each phase AC signal 120 electrical degrees apart.

Residential homes are usually served by a single-phase power supply while commercial and industrial facilities usually use a three-phase supply. Although many types of machining equipment operate off three-phase power, owners of this equipment often don't realize what this means until it's in their shop. But a lack of proper three phase power can prevent you from getting the equipment you really need, properly setting up the equipment you already have, or expanding in the future so that you can grow your business.

Whether you operate a full-time shop or tinker in your garage on the weekends, many manual and CNC mills and lathes can be powered by a rotary phase converter that doesn't require a custom building with three-phase power preinstalled. A good rotary phase converter can provide voltage balance, reliable start-up, and scalability. For voltage balance, CNC phase converters rated for three-phase CNC applications maintain at least a +/-5% voltage balance.

Unbalanced voltages from non-CNC phase converters can be hard on the equipment, causing undesirable conditions such as excess noise and poor performance. Rotary CNC phase converters can be used on any type of equipment, especially voltage sensitive machines such as CNC milling machines, lathes, PLCs, EDMs and any other type of equipment that relies on balanced input power provided the converter is rated for the kilowatts (kW) that the machine requires.

Phase converters have had a reputation of drawing a huge inrush current upon start-up, resulting in dimming neighbors' lights along with demand charges from the utility and increasing power bills. Phase converters with variable impedance technology built in drastically reduces this for reliable start-up and with no voltage drop. Additionally, a phase converter should be rated to run single or multiple motor loads.

By selecting a converter with precision balanced from a "no-load" condition, you don't need to worry about running a small motor together with larger ones using the same phase converter. More importantly, it should also be able to operate with no load engaged for an indefinite period, so you don't have to worry about damaging your unit while your equipment loads are not operating. One of the great things about phase converters is the ability to scale your energy use as your shop or business grows.

High-quality phase converters are capable of phase synchronization for increased capacity to double, triple, or quadruple your power.

MAINTENANCE & REPAIR

P.08 Luger Inspection and Repair

A common assembly error is corrected and a broken ejector replaced.

BY GLEN CALVERT OCTOBER 2021

ORIGINAL PP. 3-7

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The Luger in this article was produced by Mauser in 1942 as indicated by the “byf” stamped on the toggle and the “42” on the receiver. 1942 was the last year that Mauser produced the Luger for military use. It has a 4" barrel chambered in 9mm and is a serial number matching gun with the exception of the grips and magazine. This example is in very good condition with solid, deep bluing having some minor wear on the front of the frame on both sides, on the trigger plate, and the muzzle.

The rifling is fairly sharp but there is some pitting. The sights are small, the front blade is dovetailed into the base and the rear sight is machined into the rear toggle link. The

magazine holds eight rounds and it and the follower are steel with an aluminum baseplate and pull grips. The pull grips are necessary as the mag does not drop free when released. The issue that brought this Luger to me was the receiver would move freely on the frame without resistance (no spring tension).

When the toggle was pulled rearward and released, it would not snap forward as it should. This is typically due to an error in assembly and it occurs when the coupling link (25) on the rear toggle link (26) is not correctly positioned in front of the recoil lever (17) and fails to engage the hooks on the recoil lever. Inspection showed that was in fact

the issue with this Luger. History The history of the Luger is well documented so I will only touch on a few salient points.

The Luger was invented by Georg Luger in the late 1890s as a significant improvement over the Borchardt C93 which was arguably the first autoloading handgun design and was also the first to use a detachable box magazine. The C93 used a recoil operated toggle mechanism to cycle the action. While the action worked fine, the pistol was unwieldy, fragile, and was a commercial failure. Luger used the toggle action and detachable magazine as-

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Above far Magazine release button (18) is behind the trigger (9). Below far The bottom of the lever in the trigger plate assembly fits into the slot on top of the trigger. As the trigger is pressed rearward, the top of the trigger pivots downward, moving the bottom of the lever downward which causes the top of the lever to press inward on the end of the trigger bar assembly (3), releasing it and the firing pin (24). pects and designed an outstanding handgun, which went into production in 1900.

It aimed and shot well, largely due to the angled grip frame, and was reliable. Millions were manufactured in over 40 years of production for military and commercial use. Another successful autoloading design, the Mauser C96 "Broomhandle", preceded the Luger by a few years. The C96 is another iconic design, while a little ungainly appearing, that was very successful but was produced in smaller quantities.

The Luger was initially chambered Above far The lever pivots on the pin, the top of the lever fits into the slot on the top of the trig-

ger, and the other end releases the trigger bar. Below far in 7.65x21mm Parabellum and in 1908 it was changed to the new 9x19mm Parabellum cartridge also invented by Georg Luger and the cartridge name became forever known as the 9mm Luger. The pistol became the classic P08 Luger. Later versions of the C96 were chambered in 9mm Luger as well.

LUGERS WERE MADE BY SEVERAL MANUFACTURERS;

P.08 LUGER INSPECTION AND REPAIR CONTINUED

ORIGINAL PAGE 5

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Above far Below far The guide rod captures the spring and hooks onto the recoil lever. To disconnect the lever from the rod, a correctly-sized punch is installed in the hole in the bottom of the rod (left end in photo) and spring is compressed by pushing the punch to the right. initially by Deutsche Waffen und Munitionfabriken (DWM), then Mauser, Erfurt Armory, W&F Bern and others. DWM exported over 10,000 "American Eagle" Lugers to the United States between 1902 and 1912.

These had the image of the Great Seal of the United States roll-stamped onto the top of the receiver. World War I naturally put an end to any further imports of the American Eagle Luger. The Luger is an elegant and somewhat complicated design and such designs are often likened to Swiss watches. This

may be one of the reasons that the Swiss military was the first adopter of the Luger, buying an initial order of 3,000 guns in 1900.

The Luger saw action in both world wars and is one of the most widely collected firearms in history. Disassembly Make sure the chamber and magazine are empty. Pull back on the toggle and it should lock open on an empty mag. Remove the mag, then pull back and release the toggle; the toggle should snap forward into battery. The easiest way to remove the trigger plate assembly is to place the muzzle on a padded surface and push down on the grip to retract the receiver against the frame.

Rotate the takedown lever (7) 90 degrees and pull the trigger plate assembly (8) from the frame. The trigger plate has a tab on its rear

edge that slides into the frame and the tab must be inserted first during reassembly. Release the pressure and the receiver will slide forward off the frame. The coupling link (25) that is pinned to the rear toggle link (26) will slide over the frame when the receiver is pulled forward. With the frame and receiver separated, I inspected the interior of both.

The interior of the gun was spotless. I used a cotton swab to check the various surfaces and found no dirt or debris. This firearm had been thoroughly cleaned at some time and not used much since, possibly due to the assembly Far It must drop down in front of the recoil lever, not over the top of the lever.

P.08 LUGER INSPECTION AND REPAIR CONTINUED

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Pin is pushed out from right to left, it has a small rim on the left end that fits into the counterbore on the receiver. Leg on toggle pulls firing pin to the rear to cock it when the toggle is cycled. The blade of the ejector (21) that fits through the slot in the receiver is missing. error. I removed the grip panels to check for rust on the frame (did not find any) as it can go unnoticed if the grips are not removed during inspection.

I removed the toggle pin (20) by pulling back on the toggle slightly and pushing the pin from right to left. The left end of the pin has a small rim that fits into a counterbore on the receiver. The toggle and bolt assembly slides

out of the receiver. The extractor (35) moved freely, had good spring tension, and a sharp edge.

The extractor also acts as a loaded chamber indicator, protruding slightly above the bolt (31) when around The angled face on the tab in the center, on the blade side, had a small amount of material removed so the ejector would fit properly. is in the chamber. The word "GE- LADEN" is stamped on the left side of the extractor which translates into "loaded". The tip of the firing pin (24) looked fine and the spring (23) had good tension.

Since these parts were clean and functioned properly, I did not disassemble them any further. When I checked the trigger bar assem-

bly (3) and the ejector (21), something didn't look quite right. It took me a moment and then I realized that the business end of the ejector that projects into the receiver had broken off at some point. I removed the ejector by prying lightly on the other end at the recess in the receiver. Sure enough, the blade was missing.

I ordered anew ejector from Numrich and re-assembled the Luger when it arrived. Reassembly The new ejector required some minor fitting to snap into place. I had to file a small amount of material from the angled face of the tab in the middle of the ejector, on the blade

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P.08 Luger (Specifications subject to change without notice) 1 Barrel 2 Barrel Extension 3 Trigger bar 4 Trigger bar spring 5 Hold-open latch 6 Frame 7 Takedown bolt 8 Trigger plate 9 Trigger 10 Safety Bar 11 Safety pin 12 Safety lever 13 Recoil lever pin 14 Magazine 15 Mainspring 16 Mainspring guide 17 Recoil lever 18 Magazine catch 19 Magazine catch spring side of the tab.

The bolt and toggle assembly is inserted into the receiver, the toggle is articulated slightly to line up the holes, and the toggle pin (20) installed, left to right.

The receiver is slid back 20 Toggle pin 21 Ejector 22 Firing pin spring guide 23 Firing pin spring 24 Firing pin 25 Coupling link 26 Rear toggle link 27 Coupling link pin 28 Toggle pin 29 Toggle pin retaining pin 30 Forward toggle link 31 Breech block bolt 32 Breech block pin 33 Extractor pin 34 Extractor spring 35 Extractor 36 Grip plate 37 Grip plate screw onto the frame, making

sure the coupling link (25) drops down into the frame in front of the recoil lever (17).

Holding the pistol vertically initially and then horizontally will help. This ensures that the pins on the link are engaged by the hooks on the recoil lever. The receiver is pushed rearward until the toggle is against the frame ramp. If this requires some force, it indicates that the link and recoil lever are engaged and the assembly is correct. The trigger plate assembly (8) is installed on the frame, sliding the tab on the plate into the frame first.

While still maintaining pressure to hold the receiver rearward, the takedown lever (7) is rotated to the closed position. Allow the receiver to go forward. Perform a function check; the toggle should lock open with an empty mag in place. With the mag removed, pulling back on the toggle and releasing it should allow the toggle to go completely forward. I checked that the trig-

ger, the trigger reset, and the safety functioned correctly. At the Range I fired a few rounds at a B-27 target from 10 yards.

Due to the small front and rear sights, I rested my hands on a sandbag to minimize my influence. The first round was in the 8 ring, the next two were in the 10 ring. I shot a 7.65mm Luger a few years ago and its accuracy was rather poor. I wasn't sure where this one would impact, hence the large target. I fired a few more rounds, standing at 10 yards and all were in the 10, 9 or 8 ring. The empty cases ejected straight up, about three feet. I don't profess to be a Luger expert.

In researching the history of the Luger, I found that some of information such as production dates, design changes, volumes, and other information varied depending on the reference source. I attempted to be as accurate as possible and welcome any corrections or comments. The Luger that I inspected is a nice example of a collectible handgun and I appreciated the opportunity to examine it, fix it, and shoot it. AG

FROM THE ARCHIVE

BATFE Gunsmith Rules

The BATFE is proposing changes to their rules for gunsmiths. Here's what you need to know.

BY BEN BAKER OCTOBER 2021

ORIGINAL PP. 8-9

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I have worked as a newspaper editor, journalist, and Second Amendment advocate for many years and have researched gun control in the United States beginning with the Revolutionary War through current times. I've detailed this in my book, *The Truth Behind Gun Control*. Part of this research has included pouring over the Federal Register on guns.

In addition to changes to how exports to Russia are treated, the Federal Register includes an article about the Bureau of Alcohol, Tobacco, Firearms and Explosives changing rules for gunsmiths. The Federal Register (Federal-Register.gov) is the daily journal of the U. S. Government maintained by The Office of the Federal Register (OFR) of the National Archives and Records Administration (NARA) and the U. S.

Government Publishing Office (GPO) to provide public access about the regulatory process and Government decision-making. The article we're interested in here is "Definition of 'Frame or Receiver' and Identification of Firearms". At the time of this writing, this is a Proposed Rule by the BATFE and it could change the way the feds look at gunsmiths.

The formal summary is the Department of Justice proposes amending BATFE regulations to provide new regulatory definitions of what constitutes a "firearm frame or re-

ceiver". The Do J also proposes amending BATFE's definitions of "firearm" and "gunsmith" and to provide definitions of terms such as "complete weapon," "complete muffler or silencer device," "privately made firearm," and "readily" for purposes of firearms technology.

Further, the Do J proposes amendments to BATFE regulations on marking and record keeping that would become necessary to implement any new definitions. Specifically of interest to us are the new proposed rules in section "G.

Definition of Gunsmith." A Gunsmith would be redefined as a person "who, as a service performed on existing firearms not for sale or distribution by a licensee, devotes time, attention, and labor to repairing or customizing firearms, making or fitting special barrels, stocks, or trigger mechanisms to firearms, or identifying firearms in accordance with this chapter, as a regular course of trade or business with the principal objective of livelihood or profit, but such term shall not include a person who occasionally repairs or customizes firearms, or occasionally makes or fits special barrels, stocks, or trigger mechanisms to firearms." This means if you work on a gun once in awhile as a hobby, you do not need an FFL.

If you do it regularly with the intention to make money or as your business, you need a license. Definitions Matter This rule is

going to hinge on a few phrases in that definition. "[O]ccasionally repairs," "occasionally repairs or customizes" and "occasionally makes or fits." Definitions matter and lawsuits can turn on what one word means. Government Exclusive (GovQA.com) has an article on their website called "How One Word Resulted in a Public Records Lawsuit" regarding a California Supreme Court ruling.

The word "occasionally" is the sticking point. We have some guidance on that from the BATFE in their free PDF book ATF P 5310.2 (ATFgov/file/100871), Do I Need a License to Buy and Sell Firearms?

The BATFE does not draw a distinction between gun dealer and a gunsmith on a Type 01 or 02. "Courts have identified several factors relevant to determining on which side of that line your activities may fall, including: whether you represent yourself as a dealer in firearms; whether you are repetitively buying and selling firearms; the circumstances under which you are selling firearms; and whether you are looking to make a profit.

Note that while quantity.gov lists the full text of the BATFE's proposed "Definition of 'Frame or Receiver' and Identification of Firearms".

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and frequency of sales are relevant indicators, courts have upheld convictions for dealing without a license when as few as two firearms were sold, or when only one or two transactions took place, when other factors were also present,” the BATFE says. Page 4 of the document under “Guidance” sets down the factors courts have used to decide if you are in this as a hobby or a business. A few relevant points are: Do you have a business license to work on, or sell, guns?

Do you have business insurance covering gunsmithing? Do you have business cards or other advertising for your gunsmithing service? Do you accept credit cards and do you make a profit? Hobby Gunsmiths A hobby is not considered a business. While the BATFE is silent on the word “hobby” (and, remember, definitions matter) the Internal Revenue Service does define it. Search “Hobby or Business at the IRS website (IRS.gov) for their definition.

The IRS also has a nine point checklist based on Section 1.183-2(b) of the Federal Tax Regulations.

These include whether you carry on the activity in a businesslike manner and maintain complete and accurate books and records, have personal motives in carrying on the activity, whether The new proposed rule from Bureau of Alcohol, Tobacco, Firearms and Explosives could change how this is interpreted and create new rules for gunsmiths. the time and effort you put into the activity indicates intention to make it profitable, if you depend on income from the activity for your livelihood, whether your losses are due to circumstances beyond your control, if you have the knowledge needed to carry on the activity as a successful business, if you’ve

made profit in the past and how much, and whether you can expect to make a future profit from the appreciation of the assets used in the activity.

Search “Business and Hobby” at [IRS.gov/faq](https://www.irs.gov/faq) for more information. While predicting what a court will do is hardly a good idea, the definition of hobby in a federal sense has plenty of case law to back it up. Given that BATFE is part of the Do J, they will probably accept the IRS definition. The proposed rule also defines “gunsmith” in the “Meaning of Terms” section. Markings and Paperwork The proposed rule also requires gunsmiths to mark homemade guns with a serial number.

The rule says, “businesses that routinely... mark firearms as a service performed on firearms not for sale or distribution by a licensee, may be licensed as dealer-gunsmiths rather than as manufacturers.” International Traffic in Arms Regulations (ITAR) covers gun manufacturing. Under this rule, you can put a serial number on a home build without getting the ITAR permit. At the same time, you can say no.

The rule also says, “Also, this proposed rule would not require Federal Firearms Licensees to accept any PMFs (Personally Manufactured Firearms) or to mark them themselves. Licensees would be able to refuse to accept PMFs or arrange for private individuals to have them marked by another licensee before accepting them,” the proposal says. If all you do is mark homemade guns, you can get a license for that.

Really. “[G]unsmiths may become licensed as dealer-gunsmiths solely to provide professional PMF marking services,” the rule

says.

If this proposed rule is approved, gunsmiths who take in an unmarked homemade gun for work must mark it and record it before returning it to the owner. “FFLs would be required to mark PMFs within 7 days of the firearm being received by a licensee, or before disposition, whichever first occurs.” Under the proposed rule, a gunsmith that works on a gun without a serial number, they must put a serial number on it and then record that serial number on a Form 4473 when returning it to the owner.

The BATFE offers little to no input on that serial number should be or how you should decide what it is. Ask the owner. A suggestion: Use the owner’s last name or initials and a short string of random numbers. Another change to the rules is on record keeping and paperwork. Right now, FFLs must keep paperwork for 20 years.

The proposed rule says changes that to “indefinitely.” At the same time, storing those records is somewhat shifted to the BATFE. “FFLs could drop off their overflow records to ATF or have ATF ship them directly,” it says. You have three choices to offer comments on the proposed rule. Visit the Federal e Rulemaking Portal ([Regulations.gov](https://www.regulations.gov)) and follow the instructions for submitting comments.

Paper mail can be sent to Andrew Lange, Office of Regulatory Affairs, Enforcement Programs and Services, Bureau of Alcohol, Tobacco, Firearms, and Explosives, NE, Mail Stop 6N-518, Washington, DC 20226; ATTN: ATF 2021R-05 or a fax sent to Finally, contact your elected representatives and make your voice heard. AG

PEOPLE & COMPANIES

Winchester Wildcat

A modular, easily taken-down 22 Long Rifle that I waited two years to get. Here's how to work the Winchester Wildcat.

BY ROBERT K. CAMPBELL OCTOBER 2021

ORIGINAL PP. 10-13

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Original caption: Top: The Winchester Wildcat features trim lines..

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I first read of the new Winchester Wildcat 22 Long Rifle semi-automatic rifle some two years ago. Then, a short time ago one showed up at the local shop. What I found is among the most interesting and useful lightweight rifles in the world. That is a bold statement but completely true. The rifle is well thought out, and while functional and accurate enough for most chores, the engineering is most interesting. The Wildcat is the right rifle for the times.

Winchester used modern engineering and CNC machining to create one of the more ergonomic rifles I have handled. And this engineering and usefulness doesn't come at a

high price, being only \$249 retail. Lets look hard at the rifle. Starting off, there isn't much that will likely need gunsmithing in the short term that I can find. Tasks at the bench at first will probably be scope mounting and perhaps questions about the trigger. More on that later.

The Wildcat is a straightforward blowback action featuring easy takedown and reassembly. Most of the stock and trigger guard is plastic or polymer. The factory sights are ideal for small game and plinking with an aperture rear and post front and along rail on top of the receiver accommodates a wide range of optics. The magazine is a rotary type holding

ten rounds that is based on the original Ruger 10/22 ten shot magazines and is compatible with the Ruger.

Both of these rotary magazines come by way of the Savage rotary magazine developed over a hundred years ago for the 1895 rifle. One improvement Winchester made with their factory magazine eases filling. Rather than pressing each cartridge into the magazine, a small wheel on the magazine can be rotated to compress the magazine spring, allowing cartridges to be easily dropped into place. Of course, the 10/22 has long had af-

WINCHESTER WILDCAT CONTINUED

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Original caption: Bottom: The bolt lock/bolt release is located in front of the trigger guard. The stock design is compatible with most body types from preteen to average adult and fits most hands and shoulders well. To remove the barreled action an Allen wrench is supplied. Unscrew the angled bolt in the stock. This angled bolt is more solid of a lock up than the type that threads in straight.

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A standard Ruger type is at the bottom of the receiver along with twin levers on either side of the stock. termarket extended magazines available and the Wildcat can use them. This makes a great deal of sense when you are designing anew rifle. The magazine release is also similar to the Ruger, however, there are also rails on the side of the stock that when pressed to the rear release the magazine as well. I like this system a lot. To lock the bolt back simply pull back on an empty magazine.

The bolt lock and bolt release is ared tab in front of the trigger guard.

In common with the Ruger 10/22, the barrel isn't permanently affixed to the receiver and is easily removed by removing a crossbolt that runs across the lower receiver. The barrel is a conventional sporter type, 18 inches long, and with the standard barrel twist of one turn in sixteen inches. The metal receiver and barrel are finished in a matte blue. The safety is a crossbolt type in the trigger guard, which proved quite stiff even after several dozen manipulations.

Another good feature is a covered rail in the forward section of the stock for mounting a light or laser. Cool stuff. If you have hunted

pests and predators at night you will appreciate this feature. Stripping the gun is super easy. Unload the rifle by removing the magazine and clearing the chamber. Be certain the bolt is closed. Press your fingers into the rear of the receiver into the red button therein.

Press the trigger guard down and pull down and forward Winchester Wildcat Important specifications Caliber: 22 Long Rifle Overall Length: 36.25" Length of pull: 13.5" Drop at comb: 7/8" Barrel length: 18"

WINCHESTER WILDCAT CONTINUED

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as you turn the assembly. The rifle separates into lower and upper receiver. The charging handle rotates to one side allowing the bolt to slip out of the receiver ejection port. Another great feature is this self loading rifle allows easy cleaning from the breech end via a port at the rear of the receiver made for the purpose. Reassembly is simple enough. Line the bolt handle in the ejection port, line up the front of the lower receiver into an opening in the front of the magazine well, and rotate into position.

The assembly snaps into place. While I am surprised that so many gun owners do not bother to maintain their own rifles but I suppose this provides a steady income for gunsmiths. If one comes into your shop for that purpose you'll likely be find it filthy as rim-

fire shooters that leave it to someone else to clean likely fire great quantities of the cheapest, dirtiest ammunition they can find and then neglect to clean the rifle until the action becomes sluggish or begins to misfeed.

At least the Wildcat makes cleaning and assembly/disassembly as easy as possible. Mounting optics is simple enough and straight forward. The Wildcat trigger is interesting. It is made of composite material and trigger compression is hard and stiff at 5.5 pounds. I used two RCBS trigger pull gauges to confirm this and found some variation of two to three ounces on the trigger compression over the space of twenty pulls.

This is neither the worst nor the best I have evaluated and for simple training, plinking, and small game hunting this trigger is useful.

I had no difficulty firing good fiveround groups at 25 yards, typically grouping inside two inches using the factory iron sights. With amounted optic accuracy potential should improved. The rifle also eats everything from CCI Stingers to the cheapest loads I tried. At four pounds even the rifle is certainly light and handy enough. The trigger is usable if not ideal.

I may be able to work the trigger but it looks sealed. The bigger concern is the material and construction does not invite modification. I am hoping for some greater cooperation from Winchester and perhaps I will attempt to take the trigger housing apart in the future. It appears to be

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Original caption: Top: Note recoil spring, top, and striker spring, lower. Allen wrenches are neatly stowed in the receiver. pinned together and may be easily broken if tampered with. Of course, if this rifle becomes a commercial success, aftermarket triggers are inevitable. More on these subjects at a later date! AG A Tru- Glo laser is mounted here.

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PEOPLE & COMPANIES

Shotgun Shout-Out and XS Magazine Extension

Here's a shotgun shout-out. Installation and troubleshooting the XS Sights Remington 870 +2 Magazine Extension along with an overview of common shotgun problems.

BY ROBERT K. CAMPBELL OCTOBER 2021

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Original caption: Top: Balance and function are excellent with the XS Sights Remington 870 +2 Magazine Extension. the gun down. Begin by unloading the firearm, double checking there is no ammunition in the firearm.

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I was recently tasked with adding anew XS Sights (XSSights.com, Remington 870 +2 Magazine Extension. This unit is a 6061 aluminum and hard coat anodized part that adds capacity to a Remington 870 pump action shotgun. While the shotgun is a powerful shoulder fired weapon and very effective, some feel that the standard tube magazine capacity is cutting it a little short during a so-

cial engagement. The XS unit increases that by two shotshells, a nice improvement that doesn't add unnecessary weight or bulk.

Best of all, this extension is reliable and useful. Let's have a look at how I added one to a well-used Remington 870. A big thanks to XS Sights for clearly written instructions, which you should read through before starting. Start by breaking

Remove the magazine cap, the barrel, and the magazine retention plug by pushing it in and turning a quarter turn in either direction. When you releasing pressure, the plug should slide up and out of the magazine tube. Remove the magazine spring and follower. Far

SHOTGUN SHOUT-OUT AND XS MAGAZINE EXTENSION CONTINUED

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Now on to the installation steps. Apply a thin layer of grease on the Magazine Tube Swage and inside the magazine tube on the detents using a cotton swab, then insert in the magazine tube until it stops against the detents. Using a medium size hammer, drive the swage in until it hits the large shoulder and stops against the end of the magazine tube. Peen on and around the area of the two detents using a smooth-faced 1/8-1/4" diameter steel punch and same hammer used to drive the swage into the magazine tube.

Note, heavy blows are not needed and grasping up provides plenty of force and more control. Continue peening on and around the two detents until the swage slides free. When completed, clean the inside of the magazine tube and check to see if the follower will slide past. If it sticks or binds, a light dressing of the area with the sanding drum of a Dremel tool will finish up the process.

If upon attempting to reassemble the barrel you find the barrel lug binds on the magazine tube, lightly dress the dimple areas on the exterior of the magazine tube with a smooth fine file until the barrel can easily slide in place. Cold blue the dressed area. Trim the extended spring. For standard four-shot factory magazine tubes, trim the spring to 32- 33". XS Sights provides a 45" spring to allow for fine-tuned adjustability of spring tension as needed.

Once the spring is cut to a desired length, slightly bend the cut tip downward to ensure the sharp edge doesn't catch on anything in the tube. Stand the shotgun up on its butt. A second set of hands recommended but not required for the remainder of the install. Insert the follower. If using an aftermarket follower, make sure it drops all the way to the bottom of the tube or it won't install properly. Insert the spring, feeding it down into the tube, then turn the spring clockwise to help compress it.

Continue to lower it until there is just a few inches of the spring visible. Then insert and screw on the +2 extension until it is hand tight. If using the wrench flats, do not overtighten the +2 extension; it only needs a fraction of a turn. Using inert dummy rounds, fill the magazine the check that it will hold and cycle six shotshells when running them through the action. I had no problem installing the XS Extension on a Remington 870 and am adding one to my personal, long serving and well worn gun safe.

Common Shotgun Problems I think a bit of a problem with pump action shotguns and its users is that they have a reputation for utter unquestioned reliability which can result in neglect and misuse. Slamming the action shut "TV style" or letting the shotgun ride in the back of a truck or a dirty rack on an ATV is common. And for the most part, these users get away with it! But not always. Occasionally, some tube-fed shotguns can experience a failure to feed from the magazine. Far

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Some are better than others. One customer brought in a poorlyfeeding shotgun and carefully explained his dilemma. It was odd enough. The shells loaded normally into the magazine but then the bolt would have to be racked three to five times before the first shell would load into the carrier from the magazine. After that the shells loaded normally, either in firing or in normal dry cycling. Removing the magazine tube did not give a clue.

I polished the magazine end of the carrier and latch, mostly to occupy my hands as I thought out the problem. Actually getting the latch pin out of the shotgun, whatever the make, takes some effort. A pin usually holds the latch and carrier in the shotgun, however, there are so many types I am giving a generic description rather than specific instruction, although the chore is usually simple enough for pump action or self-loading shotguns.

Find the pivot pin the carrier rides on; this is usually the disassembly pin as well. Disassembling the shotgun until the bolt is out isn't difficult. There are usually two pins, a retaining pin and a pivot pin on the carrier. Move the pin to the rear and don't lose it as I don't

know where you would find another part in these times. Sometimes there isn't an easy access to the pivot pin but it must come out.

A special forked tool may be used or a heavy duty paper clip may be made to serve the task after being bent to shape. A typical paper clip isn't heavy duty enough but an office supply or UPS store can help. The carrier latch will come out after the pin is removed. Some have a spring at the back so don't lose this. At this point, break any sharp edges, polishing, rounding corners, and de-horning the latch. Given that it is a bit of trouble to remove parts to this point, now is a great time for a good polishing job.

The part slips back in and the retaining pins aren't any trouble. I used a fixture and vise to stabilize the shotgun as I worked with the latch and then replaced the latch pin. In the case of one of the Turkish copies I found a burr under the forend pin that actually protruded into the magazine! Polishing cured this problem. The follower was sticking where this burr crept into the magazine tube.

I suppose this was odd, however, they are turning out a lot of these shotguns, and they are keeping a good many households far

SHOTGUN SHOUT-OUT AND XS MAGAZINE EXTENSION CONTINUED

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Top Bottom If they give trouble they are easily changed. safe on the cheap. These procedures cured feed problems. More obvious problems such as a dent in the magazine tube are more easily spotted. The Remington 870 has been in use for more than seventy years. The abuse this shotgun suffered in police service is unbelievable and it still almost always comes up running. A common problem is that the first shell fires, then the bolt is very difficult to rack, and the extractor may ride over the next shell.

Most the time a malfunction is the result of residue from firing and from plastic shells in the chamber having caused a buildup. Simply cleaning the shotgun will result in improved function. Over the past decades of my using the Remington 870 and working on these shotguns for other people I have replaced exactly two Remington extractors. Both shotguns were horribly gummed up to the point the extractor was broken and I don't believe it was normal wear.

Luckily, Remington 870 extractor breakage is rare and not difficult to replace. The bolt must be stabilized when doing so and you

may fabricate a block between the forend and the receiver that prevents the bolt from moving to the rear as you remove the Remington 870 extractor. Next, using a screwdriver with a small blade, the extractor plunger is depressed into the bolt. Rotate the broken extractor forward and out of the bolt. Slowly release pressure on the extractor plunger so it will stay in the bolt.

Take the new Remington 870 extractor and push it into the bolt, applying pressure to the extractor as you move it into the extractor slot. There is a foot on the bolt end of the extractor that will be forced into place as you move the extractor into the bolt. When the foot goes into place the extractor plunger snaps into place against the extractor. I mentioned Turkish shotgun copies. I looked over several shotguns in a local shop upon request and examined them for typical problems encountered.

The new breed of Turkish-made shotguns are offered at an attractive price. While some are very good, they are made cheaply to keep the price down. It's okay if an inexpensive shotgun isn't as smooth as a more expensive op-

tion but the encountered problems may be worse and occur more often than with a shotgun as nicely fitted as the original design. As I looked over the common problems in my notebook and also the fixes, I also developed a great respect for some of the Turkish shotguns.

Despite the occasional wart, they can rival Benelli shotguns and I don't say that lightly. That is about the extent of typical problems with most Remington shotguns and the new manually operated Turkish guns based on them. While most of these Turkish guns are based Remington designs, some models are based on older Winchester designs while self-loading Turkish shotguns are close in design to the Benelli and Beretta shotguns.

While I've provided a generalization, I will be looking over more of these shotguns in the near future and getting into specifics. I suspect you'll start seeing more of them on your bench as more gun owners start using them.
AG

MAINTENANCE & REPAIR

VICEBLOX and Brass Markers

Reviewing some new tools: The VICEBLOX Lock & Hold and a how-to on marking precision rifle brass for easy identification.

BY STEPHANIE A. MARTZ OCTOBER 2021

ORIGINAL PP. 18-22

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My recent work and experience has allowed some experience with tools of interest for gunsmiths and shooters working with precision rifles. VICEBLOX The VICEBLOX Lock & Hold creates a solid platform to work on AR-15 and AR-10 lower receivers and 1911 frames. The block allows zero play, enabling gunsmiths to perform high torque repairs and steady firearms care. Jim, the machinist and designer of the Lock & Hold, knew he could create an improvement after seeing the products that were out there.

The gunsmithing world has many types of magazine well blocks and there are many options to choose from when working to complete a build. Oftentimes as gunsmiths we own more than one vice block due to needing different tools for different jobs. With a lot of these options we tend to scoff at any new kinds of tools to that pop. "Oh great, anew gimmick. Why reinvent the wheel?" Wrong in this case.

Our world within rifle building is a specific, detailed oriented, and high professionalism world that needs the tools that can keep up with that level of work. Recently a vice block hit the market that truly filled avoid within our lower receiver building, the VICE- BLOX Lock &

Hold for the AR-15 platform. Lock & Hold blocks area vice block that allows for a rock solid platform due to adding tension inside the magazine well while not damaging your lower receiver.

While many AR-15 lower receivers in the civilian industry state that they are made with Mil-Spec tolerances we know that just isn't the case. When you are using a magazine well block that is meant for any receiver you will get different amounts of play on that block. There are many high torque repairs that need to be done on lowers and any unwanted movement or play that is added to those repairs heightens the possibility of botching the repair.

The Lock & Hold block offers a setting that is to the exact specifications of the receiver on your bench, thus removing that play. VICEBLOX Use To use the Lock & Hold insert the tool into the magazine well until it bottoms out on the mag well stop built into the tool. There is no need to worry where the magazine release button is as it is not being used to retain the receiver on the block. Using the 3/16 hex wrench com) creates a solid platform for holding your lower receiver.

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The main body of the block is made with 6061-T6 aircraft aluminum so durability and strength are foremost in the design. Insert the Lock & Hold into the magazine well and tighten the two bolts an 1/8 of a turn to create tension for a solid hold. Only tighten when the tool is inside of the mag well. that is included with the Lock & Hold, tighten the block with the two bolts located on the bottom of the block.

Ensure that you are not tightening the block outside of the receiver as this can damage the block due to pushing out the tensioning sides too much. Turn the bolts approximately 1/8 of a turn; this is all that is needed to achieve proper tension. Do not overturn as this will damage the receiver. The concept is simple. The ABS insert portion of the tool is CNC'd with close tolerances to allow only a 1/4 of a turn or less for a no-slop fit within the magazine well.

Holes are then drilled through and slotted, allowing them to expand. This puts angular draw nuts in the holes so that when tightening the bolts on the bottom the top portion is allowed to expand and hold in place. When finished, those same bolts can be loosened and the tool will fall out. The VICEBLOX Lock & Hold is made with 100% USA made parts. The base of the tool is made of 6061-T6 aircraft aluminum, allowing it to be crushproof no matter how strong your vice is.

The upper portion, the portion that holds the receiver, was first made with PVC but was then changed to shock resistant grade ABS for more durability. When asked about the materials used to make the tool the inventor stated, "If I can find something that improves the quality, I will do it." If the creator will not skimp on materials he probably won't skimp on design and functionality as well.

Applications The most common repair that benefits from this tool is torquing and staking the castle nut on an AR receiver extension. This type of repair demands ZERO play to obtain the proper torque and allow your stake to hit with force. Due to the Lock & Hold having zero play, it is perfect. To ensure that there is zero play it is recommended that you have a quality vise bolted down to a solid workbench that is also bolted to either the floor or the wall.

Due to the hold on the weapon your firearm can be used in a YOST 750 DI vise and be turned upside down and sideways for different pin installs. Some other uses that the Lock & Hold is great for is if you need a lot of torque for removal of something, such as someone using Flexbar Rocksett or Loctite red 271 threadlockers. Removal of those parts requires zero play. Another use is cleaning of the firearm. When using a cleaning rod you need to ensure that it does not hit your crown

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or chamber. This requires a stable platform. While the Lock & Hold is perfect for specific repairs there are some instances when you may want to use a different block such as wanting to leave the block in the vice and switch out receivers. Due to the Lock & Hold tensioning onto the receiver, the only way to remove the receiver is to loosen the bolts and let the tool slip out.

If you are working on a lot of weapons within a day this is probably not the route you will want to go as you will have to continuously remove the Whether it is sideways or upside down the receiver will not come loose if properly tensioned. block from the vice and loosen it. For a large amount of repairs—type of repair dependent, obviously—I recommend using the Magpul BEV (Barrel Extension Vise) Block. It allows you to release the receivers from the tool quickly to swap out firearms.

Due to some vices being burred up and having sharp jaws it is recommended, subject to user preference, to use soft jaws on your vice to not harm the tool. Remember that this is a precision tool. It is not injec-

tion molded; it is a precisely made tool. Treat it as such and do your best not to drop it or damage it. Currently VICEBLOX is making Lock & Hold blocks for the AR-15/ M4, AR-10, and 1911 single stack platforms. These can all be found on ViceBlox.com as will any new products in the future.

Real Avid Smart-Fit Before readers jump the gun, the Real Avid Smart-Fit product was brought up when looking at reviews and talking to the creator of the Lock & Hold due to it working in a similar fashion. The reasons for going with the Lock & Hold over Smart-Fit is twofold: Durability and USA manufacture. The Real Avid Smart-Fit will essentially do what the Lock & Hold does, however, for how long? The Smart-Fit is not made of the same materials and precise machinery that the Lock & Hold is.

The Lock & Hold is made for professional gunsmiths who are closing vice jaws on a regular basis. Also, VICEBLOX makes AR-10 and 1911 products with the same

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materials and equipment while Real Avid does not. True gunsmiths want tools that last and get the job done correctly. VICEBLOX does just that with all their materials sourced straight from their home in Vista, California. I'll share an email I received the machinist at VICEBLOX. "I do not like cheap tools or really cheap anything for that matter. I use Snap-on tools, Milwaukee, Black & Decker, Hass, Do All, Miller Welding, Victor torches, etc. I play Martin and Fender guitars and an Excel Pedal Steel Guitar.

I shoot Remington, Browning, Colt, and Winchester firearms and reload on a Dillon Precision press. All made in the USA. You get the idea. Do I own some cheap tools? Yes, I do but if I use them often enough I will replace them with their higher quality counterpart. "I use the best hardware I can find. Grade 8 hex socket bolts as well as 0.065" thick hardened washers and 300 series stainless steel for the draw nuts. All materials are sourced from local suppliers.

The upper and lower block as well as the draw nuts are all CNC machined to close tolerances using custom designed in-house

tooling for exact repeatability. "I know this tool costs more than the competition because the good stuff always does. There is a lot more to building this than the others. When you use the Lock & Hold you notice the difference right away. Lock solid in place. We have received nothing but excellent reviews for our products. We also back these products with a limited lifetime warranty.

If it fails to hold your rifle securely we will fix or replace it at no cost to you." Marking Your Brass While there are custom tools for doing this, I'll give you an easy method to mark brass, making it Photo courtesy National Rifle League. easily identifiable against other cartridges. First, let's discuss why. All precision rifle shooters have been there. While attending a match or day out at the range all the expended brass between shooters gets mixed up.

We sit there sifting through, picking up each case individually to look at headstamps or other markings in order to identify which casings are ours. Losing brass is just not an option for reloaders, especially during ammo shortages like this. For preci-

sion shooters (I compete in National Rifle League events) replacing lost brass is not only expensive, but time consuming as well because case preparation is involved. In order to identify our brass faster, many shooters mark their ammo with a marker or paint pen.

Simple right? Well, yes. However there are still good practices and bad when it comes to even this simple task of marking your brass. What to Use Using a fine tip oil-based Sharpie or similar paint marker works best. I like using a pen-type paint marker rather than a standard Sharpie because I have found that the paint readily comes off in the tumbler but not after firing. It also leaves a very crisp line where I want it. Pink and green paint markings show up well while blue markings not as much.

Here's what not to do. Marking brass is for the purpose of solely being able to easily identify your case against others when left in a pile of different shooters' expended brass. It is not for doing crazy designs or

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The JM Custom Fabrication EZ Marker is a marker tool that isn't needed, nor are the extra marked lines. Making your ammo look cool. Therefore, marking your brass with three different lines of different colors, or even your name (yes, I've seen initials drawn on casings) is not needed, time consuming, and possibly bad for your gun. Marking high on the case wall will allow the pen to contact your chamber.

If you mark over the primers you are now interfering with primer and firing pin mating and this can leave a build up of paint on the tip of your firing pin. Thick lines with a bad type of marker inside the case can risk build up on your extractor. The trick is to mark your cases in away that won't leave excess paint or marker on your bolt or in your chamber. How to Mark The best

practice that I have found throughout my time in the precision rifle world is the one line around the inside the rim of the case.

This identifies your case and readily comes off after tumbling. Always clean it off after firing and do not build up the line with excess paint from the pen. There are some crazy Do It Yourself holders for stacking multiple markers that I have seen for sale but I don't believe these are needed. Using a plastic box for ammo, simply hold the round of ammunition at an angle resting on an open spot. Hold the pen to the inside of the rim and simply turn the cartridge in a circle while letting the pen drag on the rim.

It is easy and fast. Marking your brass for identification is a simple concept. Like anything though, there are great ways to do something and other ways that are not necessarily good for your gun. AG

RIFLES

Reader Forum

BY AMERICAN GUNSMITH EDITORS OCTOBER 2021

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AR-15 Match Builds I am starting my first venture into building a match grade AR-15 and have been reading the articles by Joe Carlos. I compete in Black Powder Cartridge Rifle and Black Powder Competition Rifle venues with buffalo era single shots, almost exclusively with Marlin Ballards, casting bullets and reloading for about 12 “hyphenated calibers” such as 45-70 Government and the like. This AR-15 project was a big diversion for me!

I was brought up on the M14 in the Marine Corps and carried an M16 as an infantry platoon leader. Of course, I had to buy an M1A once I retired from the service but never had a burn for the AR-15 until various factions started trying to legislate it away. However, I have long wanted a AR-10 chambered in 308 Winchester/7.62 NATO. This was my first foray here for me at age 65 and I have to say it's an avenue I find very engaging, despite my late entry.

Aero Precision offers their M5E1 Enhanced Upper Receiver (AeroPrecision-USA.com/m5e1enhanced-upper-receiver, as well as their M5 base model which has the more typical receiver extension. Being new to this I was attracted to the “integral free-float fixture” but after going on a parts buying spree and educating myself a little every day I see some drawbacks. The first was their proprietary hand guard.

I'm determined to proceed with what I have but I now see some issues such as your instructions in finding the sweet-spot with the barrel nut being problematic. Also, since the barrel nut on the Aero Precision is transformed from a female

thread into a male threaded affair, lapping and bedding will be accomplished somewhat differently.

For the M5E1 the bedding will now have to be done between the inside of the barrel nut and barrel extension as opposed to the inside of the receiver extension and the and barrel extension of the simpler and more typical M5 upper. An overview video I found online discusses this: youtu.be/gbWeZl6gpiis For my particular set up I purchased a Criterion barrel and the fit is fairly tight so right now trying to determine if bedding is necessary and if so, what best to use.

Squaring up the fit for the M5E1 is also a little different. G&G sells a tool which reaches down inside the integral free-float fixture and facing is done at the face of the receiver instead of on the face of the receiver extension. AERO claims it is not necessary but I'm inclined to use some 220 grit lapping compound and visually inspect the surface to ensure that is not just marketing talk. Thanks for the articles. I look forward to more in the future! Joe Carlos responds.

Thanks for the link for the Aero product you purchased. As it turns out I have built one rifle on this platform. It was an AR-15 in 224 Valkyrie. The customer supplied this strange upper and when I first saw it I wasn't at all happy! Many car garages won't allow customers to supply parts and a fair number of gunsmiths follow the same policy. I have been tempted many times to follow suit but I try to be as “user friendly” as possible.

On the customer's receiver I measured the inside diameter and matched a custom BAT Machine extension to perfectly match the receiver. When I assembled the barrel to the receiver I applied green Loctite to both and had to tap the back of the receiver onto the barrel for about the last half of its travel. That is a perfect fit! Since you already have a barrel with a garden variety extension that permits slop in the fit you will have to proceed differently.

You might want to consider the custom oversize extension on future builds, however. I was able to tune harmonics on that build by varying the torque on what serves as a barrel nut. The gun doesn't care what the barrel nut looks like or whether it has normal threads or something modified. The raised portion of the barrel extension goes to the rear until its travel is stopped by butting against the front of the receiver.

The amount of rear torque on the nut compresses things to varying degrees depending on how much torque is applied to the nut. So I was able to tune and you should be able to do likewise. John Madden Regarding fitting your barrel extension to the receiver, I have since improved this process. When using shim stock you absolutely must keep it from shifting position and ending up with part of it getting between the raised portion of the extension and the front face of the receiver.

Mess that up and you'll create a high spot and the barrel will pivot around that during harmonic whip. This will cause the barrel to return to a different position each time it is

READER FORUM CONTINUED

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fired. Not good! Shim stock is shim stock so no need to be particular. I use 0.001" thickness but 0.002" thick shim stock will just need a section half as long as what I use to work. Here is the improvement: Degrease the inside of the receiver and the outside of the barrel extension. Cut your shim stock so it is more narrow in width than the extension. I want about 1/8" of clearance between the extension on the feed ramp side and again on the side facing the raised portion.

Apply green Loctite #638 to the face of the shim stock that is going to rest on the extension. Also apply Loctite to the extension in the area where the shim is going to be placed. I place my shims on the bottom of the extension 180 degrees from the locator pin that is on top. Wrap the shim around the extension allowing the 1/8" gaps in the areas described. Then quickly wrap a heavy rubber band around everything, tightly trapping the shim in place and ironing out any high spots.

Wipe off any excess Loctite that seeps out. Let that sit for a good 24 hours and then remove the rubber band and scrape off any excess Loctite that may have dried in place. Assuming that everything is properly in place and glued down you are ready for assembly of the barrel to the receiver. Coat the outside of the barrel extension and shim with Loctite and put more

Loctite on the inside surface of the receiver. During assembly keep an eye on the shim.

It should not shift position if you performed the previous step properly!. Wipe off any excess Loctite and put the barrel nut on hard. I use a cheater on my wrench to get this really tight at this point. When you are ready to tune harmonics, break the barrel nut loose and apply your starting torque. Unfortunately, I have not found a way to true the front face of the receiver where the raised part of the extension butts against. That sucks because it is very important.

Aero is very wrong about the importance of getting that squared off! When I conducted my study of this I measured two brands of receivers: Aero and Rock River. While both were out of square, the Aero was worse! What can you expect for a lousy \$100? I would be extremely careful about hand tools designed to square receiver fronts. During my study I tried one hand held squaring gizmo that fits in a 3/8" hand drill and using it made the receiver worse!

Without knowing more about the device you plan to use, I'd be very cautious. My study of 40 different receivers revealed that the proper receiver squaring procedure is to use a lathe, resulting in an average reduction in group size of 14%. However, I just don't see any way to do it on one of these Aero receivers.

There are tons of AR outfits out there now and in order to distinguish themselves many of them come out with modification on top of modification to Stoner's basic design but some of these modifications make things worse. I sincerely hope that nobody ever asks me to use one of these modified Aero receivers again! I would avoid that facing tool kit. The facing tool that I tested looked like the one in the set you are buying but it was regular AR-15 specific.

You already know it didn't work and I seriously doubt that any of the fixtures you described will work either. What I think is wrong with these gizmos is all of them have to have a certain amount of clearance and nobody is able to keep that tool running perfectly straight. All of us apply pressure to the drill more left than right or more up than down or vice versa. The result is that using these gizmos result in one side ending up higher than the opposite side.

The maker of that tool set is like the maker of the receiver. Both will tell you that using their stuff will result in greater precision but may be making clever claims that don't hold up. The video you shared stated that the front of the receiver "looked better" after using the fixture. We don't make gun building decisions based on looks, we make decisions based on measured results and proper testing methods using the right test equipment and methods. AG

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