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EDITION

PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

04

ARCHIVE ISSUE NUMBER

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REMINGTON 760 ASSEMBLY/DISASSEMBLY

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ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 124

DIGITAL ARCHIVE EDITION

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MACHINING

More From Bill's Bench

BY AMERICAN GUNSMITH EDITORS APRIL 2014

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Tips from Gunsmith William L. Henwood, Quincy CA 95971, Holding Tapered Parts Tired of having tapered parts, such as barrels, squirting out of your machine or bench vise? These jaw liners will tightly grip parts with a tapering profile for their full length. Construct the vice jaws from angle iron 1/8" or thicker. Drill and tap for screws, drill a 1/4" hole for a pivot nail and have a brass, copper, aluminum liner running the full length. For tapered parts, just drop a nail in the hole.

This will allow the liner to pivot and adjust to the work piece's taper. **Hole Square** This shop-made tool, also constructed from 1/8" angle iron, positively aligns the drill 90 degrees to the work piece. Build one with angle iron and 1/8" plate for flat surfaces and another from two pieces of angle iron for round surfaces. To use, set the drill point in the center punch mark, then bring the corner of the hole square up to contact and align the drill bit. Drill the hole.

For smaller drills, file the radius out of the inside angle to get a more positive alignment. Use a shorter piece of angle iron to allow for the shorter drill.

PEOPLE & COMPANIES

Remington 760 Assembly/Disassembly

This iconic, century-old pump action rifle is still going strong.

BY WENDELL DEANER APRIL 2014

ORIGINAL PP. 3-8

The Remington 760 pump action rifle is almost iconic, at least in my neck of the woods. I don't remember ever going deer hunting and not running into at least one other hunter toting one. As might be expected, I live in the east, however, the 760 has shown up in areas of the west as well as up north in Maine and Canada, too. Images of a fleeing whitetail and a hunter spraying shots as fast as the action could be pumped area mostly a non sequitur, although such has happened.

I've sat on public land as dawn broke in the east and have been amazed at the incredible number of shots fired in that first half hour. Everybody is shooting a deer except me! Yeah, right. To make my case: About noon one opening day I chanced upon a group of "hunters" and asked them if they had heard all those shots. "Yeah that was us," one exclaimed. "We were rolling a tire down the hill and trying to hit it." At seven o'clock in the morning! One shot, one kill, right? What's that old Indian saying?

One shot, meat; two shots, maybe; three shots, damn fool. Pouring lead at a deer is not good practice. Pennsylvania bans semiautos from the deer woods which are basically the same as the pumps. I don't have a say in the matter, since I live in Maryland and don't hunt that state anymore, so I won't comment. The Remington 760 is the result of the genesis from the Model 14, Model 14-1/2 and the model 141 Remington pumps.

It is definitely not the same, but the idea for a pump action big game rifle is certainly not new to the company, since the mod-

el 14 was introduced in 1912. The 760 now in my shop has a serial number that indicates it was manufactured sometime during 1978-1981. It is in very good condition with only a scratch or two to provide provenance of its hunting heritage. Almost any gunshop will have one of these rifles resting in its used gun rack at one time or another.

The most common caliber seems to be .30-06, although the 760 has been chambered for over a dozen others. The cartridges chambered in this rifle qualify it to be more than just a deer gun and one which is fully capable of taking any animal on the North American continent and most African game as well. Be that as it may, I think most of the users of this rifle are blue collar types that are looking for the perfect deer getter, me included.

At this stage of my life the only problem I have with this rifle is its weight. Mine comes in at just 7 3/4 pounds unloaded. This is with a 4x Redfield scope attached in Weaver mounts, so it is definitely in the range of a woods rifle. Most of my deer rifles weigh around 8 pounds. This weight is an asset to hold a steady aim. However, to me, eight pounds seems like more of a load than it used to. I'll go even lighter if I can. This rifle is accurate.

It will put three shots of Remington factory loads in less than an inch, usually with the first two touching. If that isn't good enough for a rifle of this type I don't know what is. I checked these loads for bullet runout on my RCBS Case Master. They ranged from not too bad to terrible, but who's going to complain with results like

this? It was a magazine problem that caused this particular 760 to show up at my shop.

You have to do some jiggling to get the magazine in all the way to its seat, a common problem with these rifles. My magazine is stamped .25-06, .30-06, .270, .35 Whelen and .280. I guess you could call it generic. It feeds fine once it's seated, but getting there is half the battle. More on this later. Let's get down and dirty on this rifle. One thing I like about this design is that it's not difficult to work on. There is a large screw holding the forend on.

I found that a bit used to mount Leupold/Buehler scope rings (Brownells 080-430-430WB) fit this screw perfectly and allow it to turn out easily. My rifle has a sweated-on barrel band to hold a sling swivel while many others have the sling stud on the end of the forend. To remove the forend, pump the rifle and hold the bolt so the wood can clear the barrel band. I left mine on until I was ready to separate the barrel from the action to give a better purchase.

This gun has never been apart since it came from the factory, as far as I can determine, so it was a little tight and took a couple of pulls. The forend and action bars can then be rotated 90 degrees and will come off the recoil lug. The next step is to unscrew the action tube assembly. This is best accomplished by inserting an appropriate punch into the hole provided and turning counterclockwise. If it's difficult to start, a judicious use of a small hammer close on the punch

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It should turn out easily. can be tried. My gun had to get a few good whacks to break free, but once it did it unscrewed easily. It's possible some sort of locking agent was used at the factory. That tells me to add a drop of blue Loctite when I put it back together. As long as the rifle functions properly and nothing breaks there should never be another reason to take it down, especially since it will be used as a hunting rifle and not fired all that much.

Be aware that there are at least two types of action tubes. One goes all the way through the forend and attaches to the receiver bolt. The other kind is a two piece affair with a rubber Oring on one end where it fits into the hollow tube in the forend. Either is taken down the same by unscrewing it with a punch. The breech bolt assembly can then be

freed from its sheet metal clip at the rear of the action bars for disassembly into its components.

Some of these assemblies are riveted on and should not be removed unless necessary. These assemblies separate into two parts. The part with the locking lugs contains the ejector and its spring (held by a pin) and the extractor and its spring (held by a rivet.) Unless you want to replace the extractor it's probably best to leave it alone as it can be damaged quite easily by removal. Be careful when disassembling the ejector as it has a powerful spring that could send this small part into Never Never Land.

There is also a small bolt carrier spring which goes in position in front and around the firing pin. The cover fits into a matching cut in

the barrel. If you don't have to take it apart to fix anything, don't. Some of these parts are difficult to come by. It is easily cleaned without disassembly. The other half of the breech bolt assembly contains two camming pins (large and small) and the pin holding the firing pin in place.

On my gun the firing pin was staked in place, probably at the factory, using a chisel to tighten the hole. It can be punched out but since the firing pin was in fine order and it can easily be cleaned, I decided to leave well enough alone and not remove it. Speaking of small parts flying around the shop, I came up with a little trick to help stop this. I bought a folding poster board from my local crafts store that has three sides when unfolded and is about 36

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The spring goes over the firing pin and fits into a recess. The small cam pin is shown and the large cam pin is on the other side. I did not have to remove it, so I didn't. This part cleans up easily as is. inches high. I cut it off on a table saw to fit under the work light on my bench and use this to make controlled space to work on these kinds of small parts. Unless they fly over my shoulder or hit me in the head, this will contain such spring-loaded critical items and has saved me some grief.

I doubt if the barrel will ever be taken off this gun again, so I took this opportunity to clean it. It's not often you get a chance to clean a gun like this from the breech end. I had gone over it after last hunting season, so it wasn't too dirty. I started with a little Hoppe's # 9 Bench Rest, which does a good job of remov-

ing copper. I ran a dry patch through then used another one wet with Hoppe's #9 and added a few drops of Kroil. After another dry patch I inspected the barrel with my Hawkeye bore scope.

I wanted to try and determine just why this rifle shoots so well. I wish I could say that I found the finest looking barrel ever, but it was just ordinary. There was a little copper wash and I put a brush through it before I put it back on the gun. The chamber was fine, as were the lug seats. The leade was not damaged at all. This rifle has not been shot very much. It is a hunting rifle pure and simple and doesn't see a lot of range time.

The lands and grooves showed lots of chatter from the tooling. If you try to jam this part into the receiver it can be damaged. The part

is commercially available and sometimes it is made out of metal. This seems to be the bugaboo for most people when trying to reassemble the gun. It's not that bad if you go slow and don't try and force it. This is a three round group fired with Remington 165 grain Core-Lokt factory ammunition. used to rifle it.

They were far from smooth, however, the grooves were sharply defined as well as the lands. I have seen some rifles that literally were missing a good six inches of rifling all together. They wouldn't shoot worth a hoot. If I see a bore like that I know the rifle needs to be rebarreled. The bore scope will not necessarily tell you which rifle will shoot and which will not, barring catastrophic damage. Regardless of

REMINGTON 760 ASSEMBLY/DISASSEMBLY CONTINUED

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35 Remington. It weighs about the same as the 760. Remington has been producing pump-action big game rifles for close to a century. pitting or tool marks, you just have to shoot the gun to see what it can do. A bad barrel will not shoot anything well. Some barrels will shoot a few loads adequately. A good barrel will shoot almost anything you stuff in it; at least it won't spray groups all over the target, all things being equal.

The trigger plate, as Remington calls it, houses the firing mechanism and is easily removed from the receiver by punching out two pins using a 1/4" punch and a 1/8" punch. They have roll pin heads but are not true roll pins. I used roll pin punches so as not to mar

them. The trigger plate contains the magazine latch and spring which can be removed by compressing the small spring and pulling off the latch from the pin. This pin also holds the hammer, the action bar lock and spring.

Lifting the action bar spring will allow you to free the pin and tap it out. Do not attempt this if the pin is riveted in as it is on some guns. The hammer can be released and the spring lifted out of its seat, which is normally held in place by the action bar lock. At this point the sear can be pushed back and the trigger spring removed. Punch out the sear pin and the sear can be removed. The most popular seems to be the .30-06. Nowadays, they are more scarce. 30-06.

The other has five different calibers based on the '06 case. It is more "generic." Dimensionally they appear to be the same and both work well if properly cared for. Before punching out the trigger pin, note some of these pins have serrations on one end. If present, that end comes out first and goes in last. Remove the trigger and trigger connector. Do not try to disassemble the trigger connector from the trigger as it is riveted in. The trigger is a restricted part.

The safety pin can be punched out and the safety and its spring removed. Some guns have a plunger and spring and others have a ball bearing here, depending on the year of manufacture.

REMINGTON 760 ASSEMBLY/DISASSEMBLY CONTINUED

ORIGINAL PAGE 7

I did not take this trigger plate assembly completely apart for the sake of this article. It can be done safely but don't do it unless you have to. You have to remember that these guns are not manufactured anymore and parts can be almost impossible to find. If something breaks or you lose a spring you are on your own. A perusal of Remington's web site has a parts schematic that classifies the items as restricted, obsolete or maybe. There may be other suppliers I don't know about.

It's always prudent to check Midway, Numrich, Brownells, etc. Be that as it may the assembly is easily cleaned and inspected without disassembly which was the Remington designers' idea in the first place. So unless you have problems with it, leave well enough alone. I can imagine the look on my customer's face if I tell him that I put his favorite hunting rifle out of commission and don't think I can fix it. At this point a thorough cleaning and lubrication of everything is in order.

Don't overdo the lube, especially if it's petroleum based and can freeze and gum up the works. This gun must be capable of operating under extreme hunting conditions, so a little dab'll do ya'. The action must work smoothly and freely but not slop oil all over when you rack it. I put a little Gunslick graphite-based grease on the back of the locking lugs and anyplace I think might need it. I'm not saying this stuff is the best, but I've used it for along time with good results. It won't freeze and is inexpensive.

I have not tried every new lubrication/rust preventative product on the market. I don't think I'll live long enough to accomplish that feat. What would you call that, The Grand Slam of Grease? Another thing to mention in the reassembly of this rifle is the ejection port cover. It can be a real pain in the neck trying to get this part back in the gun without damaging it. It is usually made of tough plastic although it can be metal.

Schematics are of little use on this one as they just show where it goes, not how to get it back together. From listening to Internet chatter, this part is the one most people can't figure out. Study how this part fits into the grooves provided on the inside of a stripped receiver and record the relationships to other parts before you tear your gun down. It probably wouldn't be a bad idea to take a good picture or two for later study.

It's not that getting this piece back together is impossible; it's just that this is one of those times where you might say, "I'm throwing this piece of **** out the window!" Indent the end where it fits into the barrel and hold the bolt closed while replacing it on the receiver. I find it much easier (unless you have four hands) to put the rear stock that holds the receiver upside down in a vise and guide everything in carefully, making sure the ejection port cover goes into its groove.

This should all be inserted as a unit/assembly. Sometimes using a small instrument like a dental pick can help guide the cover. Keep at it and it will go in there, I promise. One thing that is crucial: DO NOT put the receiver in a vise. You will only bend it and it can be very difficult to get it strait again. Use the barrel or the rear stock to hold the rifle, and don't crush them, either. I also promised to say a little bit about the magazines of these rifles.

If you have feeding problems check the magazine first unless it's something obvious like a cracked bolt or whatever. You will find that if you observe some of your customers they will ram these magazines home and give them a couple of whacks with the palm of their hand for good measure. It's no wonder the parts can be damaged by the time they get to you. I haven't seen it all, but sometimes I think there isn't anything some people won't do to ruin a fine firearm while trying to make it work.

Check carefully for damaged feed lips. The lips should hold the cartridge at least until it is around halfway in the chamber or in

far enough that the bolt can drive it home without a jam. They can be brought back to life if you know how. Otherwise, if you can't get them to work, anew magazine is in order. In years past there wasn't any gunshop I walked into that didn't have at least one display of new magazines for these rifles. Nowadays they are more scarce. The new 7600's magazine can work but may need tweaking.

Sometimes a little modification is needed around the area that the latch fits into and possibly some fitting in front where it meets the trigger plate. I find treating all the firearms that come in my shop as precision tools that will take care of me if I take care of them is the best policy. I don't slam, rip, whack or anything unless I'm in my rage mode and reach for my four-pound hammer (don' cha' hate it when that happens!) Show your customers how to put a magazine in the gun. I start the front in first.

There is a hole in the front of the receiver that mates with a small protrusion on the front of the magazine. Make sure the magazine latch is securing the rear as it should. Sometimes the magazine will not fully seat if this is not done and, of course, will jam. If you have to whip out a freshly loaded magazine and slam it into the gun after firing five rounds at your fleeing (or, worse, wounded) animal I think you should have one of the AR style rifles that are made for this kind of combat.

The 760s were never intended to be used in this manner, although they can be loaded quickly and safely by someone who knows how. If you work on local firearms and are not specialized in ARs or handguns or shotguns you will find one of these popular hunting guns in your shop. I am on the lookout for parts for these and other rifles when I visit the gun shows. It doesn't hurt to pick up a magazine, sear spring or bolt carrier assembly if you can get a good price. You never know when they will come in handy. AG



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MAINTENANCE & REPAIR

Building The 90 Grain AR-15, Part One

An overview of building competition/precision .223/5.56 AR-15 rifles to handle the heavy bullet, long-range loads.

BY JOE CARLOS APRIL 2014

ORIGINAL PP. 9-13

Two breakthroughs allowed the M16/AR-15 to replace the M14/M1A as the Service Rifle match winner in recent years. They were the float tube, which prevents applying pressures to the barrel, and high quality, accurate match bullets that are more wind resistant than 55 grain GI ball. The float tube is still with us but when is the last time you saw anyone win with 55 or even 69 grain bullets out to 600 yards?

Just as heavier bullets with higher ballistic coefficients replaced the 69 grainers, we are seeing the new 90 grain projectiles making their presence known in Service Rifle competition. It's possible a customer is going to approach you regarding converting to use heavier bullets. This series will help you provide guidance to them. Very Low Drag .22 caliber, 90 grain bullets have been around for about a decade.

JLK was the first to introduce them around 2004 and their bullet is still available through Swampworks (swampworks.com), having the highest BC of any 90 on the market. Berger also offers a VLD 90. Many High Power shooters avoid the high maintenance VLD bullets in any weight and don't want the extra work of "chasing the throat." Sierra introduced their 90 grain boat tail in 2005 proclaiming that it was a major advancement for long range shooting with the AR-15. "Long range" to most of us means 600 to 1,000 yards.

As you are probably aware, boat tails don't normally require chasing the throat and are relatively maintenance free. The AR-15

is most commonly equipped with a 20" barrel although some "funny gun" match rifles have 26" tubes. Just as people load their 80s to different velocities, folks experimenting with 90s also push the speed envelope to varying degrees, so it can be difficult to compare the two.

Using ballistic programs, I've come up with an estimate of about 17% greater "wind proofing" by switching from 80s to to the VLD design shows an improvement of 28.6%. No doubt about it, 90s are better mouse trap! Saying that 90s will be about 17% more "wind proof" than 80s is a bit abstract, so I dug out a ballistic calculation program and arrived at the following example.

Shooting an 80 in a 10 mile per hour full value cross wind at 600 yards results in about 34.5" of wind drift, requiring a 23 click (with ¼ minute of angle sights) correction. A 90 in the same conditions drifts only 29.5", requiring three less clicks. That in itself is no big deal and anyone can reach up and move the sights three more clicks.

If the wind never changed, life would be good, however, if there is any such thing as a range where the wind blows consistently during the twenty minutes of record fire at 600 yards I have seldom experienced such. Where the 90s pay for themselves is when the wind is changing rapidly and unpredictably. Let's say you have a perfect rifle capable of shooting an X every time at 600 and that you are skilled enough to point it there.

Now let's say that your last shot was a pinwheel X and, as you admire it in the spotting scope, you see no change in conditions. What happens if, as you come off the scope and roll over to execute the next shot, the wind picks up to from 10 to 12 mph and you don't catch it? If you are shooting an 80 that shot is probably going to come up in the 9 ring. A 90 would have held the 10 ring. Does this happen in real life?

I have an inbox of emails from satisfied customers relating cases where everyone else on the line got caught in a condition change except them. I'm not advocating just lying on the mound, relying on the ballistic superiority of the 90 to "shoot through" condition changes, but it is simply a reality that we all eventually get caught by wind pickups that we don't see. The 90s will harvest you some points in such situations.

Comparing guns with equal length barrels, 90s shot out of a .223 Remington will be the ballistic equal of anything that can safely be shot out of a .308 Winchester and the 90 will do so at greatly reduced recoil. Visit me on Commercial Row at Camp Perry (I am normally in Building #910-A) to see test targets yourself. 90 grain bullets can be loaded using the existing tooling and shot out of the Stoner platform Service Rifle competitors are already comfortable with.

As a military match armorer for over a decade I had the opportunity to test hundreds of rifles and barrels,

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This increases dwell time, helping with primer retention when running hot loads of any bullet weight. and I kept meticulous records.

In analyzing those records I found that 90s, on average, shot groups 7.7% tighter than 80s and did so with no degradation to 77 grain magazinelength ammo performance. 90 grain Berger boat tails, when shot out of quality Krieger or Bartlein cut rifled barrels with 0.218" lands and 0.2245" grooves, were about half as likely to shoot a flier as 80s, and if they did the severity was just about half as much. So why aren't more people using 90 grain bullets? First, there is a lack of loading data.

If you follow what little load data there is you will not be able to reach speeds that will keep bullets supersonic to 1,000 yards. Current published data is very conservative and many shooters confident in working up loads for their particular rifle when provided an idea on where to start are reluctant to get involved without published recommendations.

I will provide data on specific loads in the later article on reloading that have worked in a variety of barrels with one critical caveat: Start well below any recommendations and work up slowly, watching for signs of pressure. 90 grain bullets require more finesse than loading more user friendly 77s and 80s. Control of things like bullet seating depth, concentricity and neck tension are very important, along with use of a

good chronograph. I strongly recommend reading Glen Zediker's Handloading For Competition.

Another problem, to shoot 90s across the course you need a barrel with a different twist rate. JLK and Sierra recommend a fast 1:6.5" twist barrel to stabilize their long 90 grain bullets. Berger says that 1:7" will work with their bullet, however, I have tried 90s in a few twenty-inch 1:7" bores without much success. They stabilized and didn't keyhole but just weren't as accurate as I wanted. Berger's 90s shoot great out of 1:6.5, however, so I just quit trying the 1:7s.

Buying 1:6.5" barrels permits use of all 90 grain bullet offerings, making the chances of finding a successful load greater. The 90 grain Berger B. T. requires a taller 0.218" land (industry standard is 0.219") and a slightly deeper 0.2245" groove (industry standard is 0.2240".) Only three barrel makers offer these specific options: Krieger, Bartlein, and RKS Enterprises in Canada.

A third issue is the lack of interest with some of the big military teams and attitudes about sharing information vary quite a bit among the more successful teams. Regardless of their official position, information eventually leaks out and trickles down to other shooters. Some teams are fairly helpful while others are closed mouth, especially with regard to load data. Remember, they typically use brand new brass with crimped primers so their loads are often too heavy for civilians.

Some of the military teams also use unconventional chambers that allow loads with higher powder charges as well. The Army Marksmanship Unit shot 90 grain VLDs in the early to mid 2000s, before the boat tail designs were available, using them mostly for 1000 yard matches and not across the course. One of their shooters using JLK 90s broke a 1000 yard Interservice record that I had held for nearly a decade with an M14 and heavy 180 grain bullets.

VLD bullets require "chasing the throat", on going measurement of erosion and increasing bullet seating depth to compensate. The AMU uses their support staff to take these measurements and load ever-changing ammo. That had to be a real pain, as there were only about three barrels available at the time, but they did quite well considering the limited options.

In 2005, when Sierra introduced their 90 grain boat tail, it was obvious the AMU wanted to transition to a less maintenance heavy option as they had a pallet of the new bullets. When they watched the Army Reserve Service Rifle Team blowing up these new bullets in early 2006, I think that was the straw that broke the camel's back and they threw in the towel shortly after that. A few years later the AMU came out with their AR-10s (M110), which they had to petition the NRA to accept as legal service rifles.

MOST OF THE OTHER



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308 loads. All were fired in 20" barrels. big military teams tried Sierra 90s at one point or another and had problems with mid air blow ups. Most of the big military teams wanted to use existing technology. While the Army Reserve shared that same desire, they stayed the course and worked with barrel manufactures and bullet companies to market better 90 grain options, leading to the success of 90s today.

A fourth issue, 90 grain bullets have a reputation for bullet failures, with projectiles blowing up mid air somewhere between exiting the muzzle and hitting the target. One manufacturer's product (packaged in green boxes) has really been the subject of a lot of bad mouthing in the pits and on some websites. This is a valid concern and regardless of how many points 90s may gain by virtue of their "wind proofing", it is nearly impossible to recover from a loss of ten points due to a bullet failure.

I think that in early 2006 when these bullet blow ups were being reported those stories caused a lot of confusion among shooters and all 90s got a bad rap when only one brand was actually guilty. I have never blown up a JLK 90. A few years ago Berger thickened the jackets on many of their VLD bullets and the 90 was one of them.

Current bullets are absolutely reliable, however, 90s became suspect and not much was happening between 2006 and 2008 when the Army Reserve talked Berger into offering a user friendly, reliable, thick jacketed 90 grain boat tail. There are some lesser challenges to shooting 90s as well.

First, since we are spinning these bullets at RPMs faster than with 80s and are often reaching high pressures, especially with 1000 yard loads, bore fouling (both copper and carbon) will usually be evident earlier and likely be more pronounced. This will require earlier, more frequent and vigorous cleaning, or accuracy will suffer. In 1:8" twist barrels, 80 grain bullets commonly run be-

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Turn the rifle on its left side so oil distributes around the rings. Have a rag handy to remove any excess from the carrier that can splatter your shooting glasses. Between 247,500 and 252,000 RPMs while 90 grain bullets fired out of 1:6.5" barrels hit between 288,000 and 293,538 RPMs.

Second, because of the above factors coupled with increased heat, 6.5 twist barrels may wear out faster than normal. "Wear out" in 6.5 twist barrels won't be just in terms of the length of throat erosion but also in the roughness of it. When I first started working with 90s, some of the barrels, especially those made of an allegedly softer steel used by button rifling manufacturers, were coming into my shop exhibiting early signs of fire cracking at the throat as far as six inches down the bore.

As I bore scoped these barrels I also saw many of them with deeper and rougher erosion around the gas ports, which can also adversely affect accuracy, especially if you are using a thinner jacket bullet. I'll jump ahead a little and tell you that roughening of the throat, rear of the barrel, and gas port are major contributing factors to bullet blow ups. More specifics on this later. What kind of barrel life can you expect? I hate to put figures on this because it is so variable and depends on many factors.

A couple of years ago I bought a bunch of 1:6" twist stainless button rifled blanks from a respected barrel maker. They were all made from the same run, turned and

chambered by the same shop. I fitted two of them to uppers, worked out loads and sent them out to two different shooters. When they left my shop there wasn't any difference in the throat lengths. The first shooter fired Varget powder in his rifle and cleaned with Hoppe's.

He has over 1,500 rounds on it (plus the 200 or 300 I put on it developing loads) and sent it in recently so I could reset the bullet seating length to compensate for erosion. He had less throat erosion than the second guy's barrel and this upper was still shooting the best of any upper I have ever tested of any manufacture, twist rate, shooting any ammo! The second shooter used imported high energy powder in his and cleaned with one of the new "gee whiz" bore solvents.

The barrel was literally destroyed in 500 rounds (plus what I put on in load development, which I estimate to be about 200.) The throat erosion was deeper than the sister gun and it shot like crap! When I was shooting the high energy imported powders in my button-rifled, chrome-moly barrels I have had any number of them go out at about 500 round counts.

Now that I have switched to more conventional powders in these barrels I haven't had a single one go out at anything less than 1,000 and some are pushing nearly double that. Barrel makers that use one of the cut rifling processes frequently say that their steel is harder and that their products

will last longer. I was always skeptical of some of these claims until I got into this project. I have to say, my cut rifled barrels are lasting noticeably longer.

I hope to get 2,000 rounds out of them and maybe double that out of some. Gain twist seems to be helping with longevity a lot. By starting to rotate bullets slower at the back of the barrel they move away from the throat quicker and the hot erosive gasses don't spend as much time attacking and eating the throat. A third factor is barrel heating. Spinning bullets faster causes more friction and thus more heat. Powder charges tend to be heavy and that adds to the heat problem.

I would be aware that barrel mirage may be more severe with 6.5 twist barrels, regardless of bullet weight. Fast twist barrels would certainly not be my choice for shooting the Infantry Trophy Team Match! Some barrels, perhaps more so with stainless unless it has been stress relieved, tend to "walk" (shift zero) when they heat up and this can certainly be a problem with a 6.5 twist that heats up faster. In addition to potential zero shifts, accuracy can degrade as some barrels heat up.

I recommend when practicing with a 6.5 twist to not shoot more than two back-to-back strings of rapid fire before sitting the gun aside for at least one minute of cool down per round fired. When shooting long

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range slow fire and need to extract around because of a cease fire or change in conditions, I recommend placing that round last in the firing queue so it has time to cool. It takes very little time in these hot chambers to change the burning characteristics of the powder. This is a good habit to form even for those shooting 80s, especially later in the string when barrel temperatures are running higher regardless of twist rate. High temperatures will dry out any lubricant on the bolt carrier assembly much faster.

I recommend starting each match or training session with an immaculately clean bolt carrier assembly, properly lubed. Try supplementing that with a drop or two of quality gun lubricant before shooting your 300 yard sighters and again before 600 yard slow fire. Consistent bolt carrier velocity is key to positioning the cartridges uniformly in the chamber and applying the same pressures to the case head each time.

Accuracy in any Stoner rifle can improve by keeping the bolt carrier properly lubed regardless of bullet weight and twist rate. A fourth issue is primer retention. If you are going to keep your VLD 90s supersonic to 1,000 yards it is recommended to start them at 2600 feet per second. Because the Sierra boat tail bullet has a lower B. C. you need to start it at 2650. Achieving these

muzzle velocities out of 20" service rifle barrels will require pretty heavy powder charges which result in high chamber pressures.

Brass life is going to be very short, sometimes only one firing. Even military shooters with access to crimped primed cases will occasionally find a spent primer lodged either in the barrel extension or under the trigger mechanism. Either one will disable the rifle and take a fair amount of time to remove. Use of bolt carrier weights, such as David Tubb's Superior Shooting Systems design (davidtubb.com), may help to lengthen dwell time, keeping your bolt locked up a few milliseconds longer.

This can result in at least getting the casing clear of the ejection port before the primer falls out. As with anything else in the gun business, follow the manufacturer's recommendation, but I favor using carrier weights only during prone slow fire stages and removing them for rapid fire. Any modification of the bolt carrier assembly can affect both zeroes and barrel harmonics. If you are going to use weights make sure they are present both during zeroing and load work ups.

The most effective way to control chamber pressure is by use of either again twist barrel from RKS (six groove) or Bartlein (5R

or 4 groove.) With either, specify a tall 0.218" land and deep 0.2245" groove. Starting twist in front of a Wylde chamber should be 1:13" finishing at the muzzle at 1:6.5". Another effective design is the four groove Brux Narrow Land. Since using these three barrels I have been consistently able to reach 2,600 FPS of muzzle velocity in 20" barrels with no primer issues.

No carrier weight is required with any of these barrels. Such a starting velocity will bring a 90 grain Berger through the 1,000 target with a strong remaining 1,249 FPS (the speed of sound is about 1,100.) Accuracy is stellar in all three. The Match Rifle shooter has other options for controlling dwell time. In those rifles, gas ports can be drilled two inches further forward, increasing dwell time (how long the bolt stays locked) up and primer retention is of very little concern.

I start my gain twist 26" Match Rifle barrels at 1:14" just in front of a Wylde chamber and finish at 1:6.8" at the muzzle. No carrier weight is required and 90 grain Bergers exit at 2,700 and arrive at 1,000 yards at a very strong 1,349 FPS. Next time we will talk about barrels for use with 90 grain bullets. AG

FROM THE ARCHIVE

Precision Barrel Fitting, Part One

The first in a series to guide gunsmiths with some machine tool experience for chambering and fitting a rifle barrel safely.

BY CHICK BLOOD APRIL 2014

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I think it appropriate to begin with a bit of biblical theology as I understand it. Here goes: The Old Testament emerged from the words of Hebrew prophets. The New Testament grew from the Disciples of Christ. Together, the two are the basis for all Jewish and Christian religion. That brief summation might be over simplified. To say the least, it is definitely the odd-est of ways yet attempted to start off an article on gunsmithing. There-in other Testaments must be added. Colonel William S.

Brophy authored The Springfield 1903 Rifles, considered the bible on Springfields. The same Brophy composed another bible, Marlin Firearms: A History of the Guns and the Company That Made Them. Both belong in your reference library right next to Hatcher's Notebook. Add to them another unchallenged bible, Mauser Bolt Rifles by Ludwig Olson, The Winchester Book by George Madis, Remington: America's Oldest Gunmaker by Roy Marcot and you're beginning to sense a trend here.

So far, I haven't mentioned The Complete Illustrated Guide to Precision Rifle Barrel Fitting by John Hinnant. Without question, it is recognized as the bible on the subject To order, call John Hinnant or Dave Manson The cost is about \$39.00 and worth every cent. It dates back many years but still takes the great mystery out of operating the machine tool used more by gunsmiths than any other.

To order, call South Bend Lathe by the publishers of American Rifleman and Precision Shooting, Shilen Rifles, as well as several dozens of greatly respected precision toolmakers and 'smiths. It also provided the road map that kept yours truly from fouling up big time way back when I first tackled a rifle barreling job. I have received permission from its author to borrow significantly from his work in preparing and illustrating this article. As entitled above, this will not be a pure, condensed

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The company produces lathes designed from the ground up for gunsmithing. They are far more expensive than the one pictured here but, depending on your specific requirements, the 1002 could represent a considerable savings. version of the Hinnant work. That approach, in my opinion, assumed the serious risk of accidentally omitting even one or two of the vital details he provides. Since omission is not to be justified, a better course has been chosen.

In this and all the articles to come on this specific subject I will be cherry picking the book in sections. I believe this will serve handsomely to encourage members in recognizing the total excellence of John Hinnant's 304 page classic. Within those pages are tables of valuable information that deserve a prominent place on your shop wall. For example, there's one defining lathe cutting and feed rates for a variety of materials. Two more pages express fraction-decimal-metric and millimeter-to-inch equivalents.

Quotations appearing here and in the Guide area attributed to the well known authorities who made them to emphasize a point being made regarding a specific rifle. These quotations are not to be taken lightly. Remember them verbatim and from which source they originated. Nearly needless to say but being said anyway is barrel replacement, chambering and fitting calls for acquiring a useful knowledge of how to work with a lathe.

True, you need not be a master machinist with years of experience to acquire enough know-how to apply the practices spelled out in the Guide to your advantage. I do advise you not invest in a multipurpose machine tool. Too often, these are incapable of delivering the close tolerances that come almost automatically from a lathe designed for gunsmithing. If the cost of one causes you to pause, don't purchase it initially.

I was faced with that exact problem, so I laid out the bucks for a small, Austrian-made one to get familiar with lathe operation. I still own it and use it for fabricating small parts for firearms and probably will never part with it. The large gunsmithing lathe I subsequently purchased for my rifle work I sold many years ago.

It was a sad farewell, but the state in which my business was located outlawed hunting with a rifle, leading to such a major decline in my riflesmithing practice the big lathe wasn't paying for the space it was taking up in my work area. In addition, it had outlived its usefulness as a tax deduction and was replaced with a well built, table mounted milling and drilling machine tool equipped with an X-Y table, the depreciation of which remains an entry on my 1040.

I'll suppose that you have no desire to or haven't yet squirreled away sufficient funds to purchase a

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small lathe to practice on. You can still bone up on lathe operating. Among those ways is *How To Run A Lathe* from South Bend Lathe. Many, many other possibilities will appear on your computer monitor after directing your browser to “Machine Tool Operations,” or “Lathe Operations.” If your nerves remain a wee bit rattled about lathe operations and hands-on is the only way to settle them down, check into any adult classes going on in machine tool operation at a high school or community college.

If nothing turns, ask around at nearby machine shops. Get lucky and you’ll find an owner who might be willing to let you sit in beside one of its lathe operators for some of the hands-on experience you need to calm yourself. The good news concerning making significant investment in a gunsmithing lathe is twofold. First, like my milling/drilling acquisition the investment can be depreciated as years pass. In other words, written off at tax time.

Second, in subsequent articles there will be at least one dedicated to the hand tooling now available for critical barrel fitting work. *Getting Started* There is no substitute for a good barrel vise. There’s more than one good barrel vise on the market, so you have a choice. If you have any doubt the one chosen could be better, don’t risk

the purchase. Hinnant shows you how to make your own from scratch and his design results in a vise proven successful, meaning no failures, for over 20 years.

Check out the components. No assembly bolt smaller than one inch in diameter is used. Exception: If the barrel requires a wider base plate (1) and sliding plate (2) with an assembly bolt positioned at each corner, nothing smaller than ¾-10NC is recommended. Page 17 of the Guide details the procedure for locating and drilling perfectly aligned holes in the base and sliding plates. A boring bar you can fabricate appears on page 20.

Boring comes into play to enlarge holes when drills large enough to do the job aren’t available. Boring also is applied to enlarge holes in the sliding plate to avoid the possibility of the plate binding. Clamp Blocks (10) are drilled and bored to a 1½" minimum diameter holes simultaneously in an independent 4-jaw lathe chuck. Place a 1/8-3/16" thick cardboard spacer between the blocks prior to the drilling. This will eliminate an interrupted cut, known to be hard on tool points.

Follow this drawing to make one or head out to your nearest industrial tool supply store and lay down the dollars. Either way,

you’ll be needing one. These hold the split bushings described in the text that protect the barrel finish during removal and reinstallation. The barrel vice’s split bushings (#4) can be turned, drilled and bored from a variety of materials, such as hardwood, high density plastic, brass or lead, though Hinnant’s preference is aluminum.

Round scrap can usually be found at a metal salvage yard, or square or rectangular shapes can be secured in a four jaw lathe chuck and turned. The final hole in the bushings should equal the diameter of the breech plus the thickness of a cardboard backing from a writing tablet. Before the split bushings are used the cardboard is removed, coated with rosin and reinserted between the barrel and the bushings to prevent them from scratching the finish or slipping.

The interiors of straight-walled bushings do not serve tapered breech rifles, such as the Remington 700 and Winchester 70. True, they must be drilled and bored larger than the breech and cardboard insert, as were the straight-walled bushings. Then the breech and any receiver ring present have to be coated thoroughly with epoxy release agent (paste car wax makes a dandy substitute.)

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The bushing is then slipped over the breech. Fill the space between the barrel OD and the bushing ID with epoxy. Acraglas or Acraglas Gel laced with aluminum or fiberglass filler is recommended. Once the epoxy has set, gently tap the bushing off. Tap toward the muzzle and provide clearance for the cardboard by wrapping the breech with a couple of turns of masking tape. Cut the bushings in half, dress any rough edges with a 0-cut file, sand them smooth and they're good to go.

Additional, specialized instructions for preparing clamp blocks for Ruger #1 and #3 rifles appear on page 24. The blocks are drilled and bored as already described but the left side of each has to be machined to provide clearance for the forearm hanger bracket. The bracket is cast to be integral with the receiver. This requires the

receiver be unscrewed a little at a time. Note, Ruger barrels, rifle or otherwise are notorious for being screwed in very tightly.

Getting one started out very often makes the use of an extension to the receiver wrench mandatory. Due to this dedicated love affair, extreme attention must be paid to not allow the barrel to slip in the vise. This can require the vise to be loosened and retightened three or four times before the barrel is loose enough to be unscrewed by hand. One more thing: To prevent damage to it or, worse, the receiver, the extractor has to be removed prior to making any attempt at separating the devoted couple.

If you feel uncomfortable about your machine tool skills and tackling the fabrication of this rifle vise, Brownells offers one to erase your concerns. Next step, the action wrench. AG

PEOPLE & COMPANIES

The Ruger LCP

Common problems with Ruger's Lightweight Compact Pistol and getting it up and running.

BY ROBERT K. CAMPBELL APRIL 2014

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The Ruger LCP is a very popular handgun, being small, flat and concealable.

The rub is quite a few folks load it, fire a magazine through it, and never practice again. The shooters that do practice with the LCP sometimes find it comes up short on performance. After a few brushes with the pistol, the cures are now standard and were simply common sense. As an example, among the first problem areas that began showing up with the LCP were dents in the ejected case and nicks in the case rim.

Positive extraction and ejection is all good but that wasn't the problem. The problem was that the aluminum portion in the polymer frame needed to be properly trimmed

and lowered as it was protruding just below the extractor and Above center: Using punches to remove the spring cap. spent cases were contacting this area. This type of defect might also be responsible for poor feeding. A combination of filing and polishing away some 1/8th of the sub-frame cured this problem neatly.

When examining the Ruger under magnification it is obvious how rough some cast and aluminum parts can be. This is simply part of modern production. By carefully polishing these areas and removing burrs and rough areas, you will decrease friction and make for a smoother and more reliably operating handgun.

When polish- Below left and center: Using a wire or string to capture and remove the spring. ing a handgun it is good to strive for a smooth surface but when addressing the feed ramp it is best to remove any sharp edges or tool marks. The LCP will usually feed the Remington 102 grain Golden Saber load and the Hornady 90 grain XTP, while other loads with a wide mouth may be more problematic. It is best to begin with 600 grit sandpaper and carefully polish the feed ramp.

Do not work the feed ramp too much but carefully place the sandpaper on the end of a wooden dowel and sand carefully, going back and checking for ridges or rough edges

THE RUGER LCP CONTINUED

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Above center and on the feed ramp. For a true ledge or ridge, no matter how very small, sometimes a jeweler's file is the best starting point. When polishing the feed ramp do not neglect the chamber as there can be reamer marks. Also polish the barrel hood as the bullet nose sometimes connects with this ramp. Polish the barrel hood and breech face where they meet. This is a standard procedure with all but the very finest self loading pistols and makes for smoother feed and function.

Do not actually remove enough of the barrel hood to affect the locking of the hood into the slide. Be certain that there are no raised edges around the firing pin channel. At the rear of the slide where the hammer meets the slide, take a look and polish any rough areas as this is a common rough spot. It can be de-

sirable to polish the trigger bar. I am not certain this helps the trigger pull weight but it does seem to smooth the action.

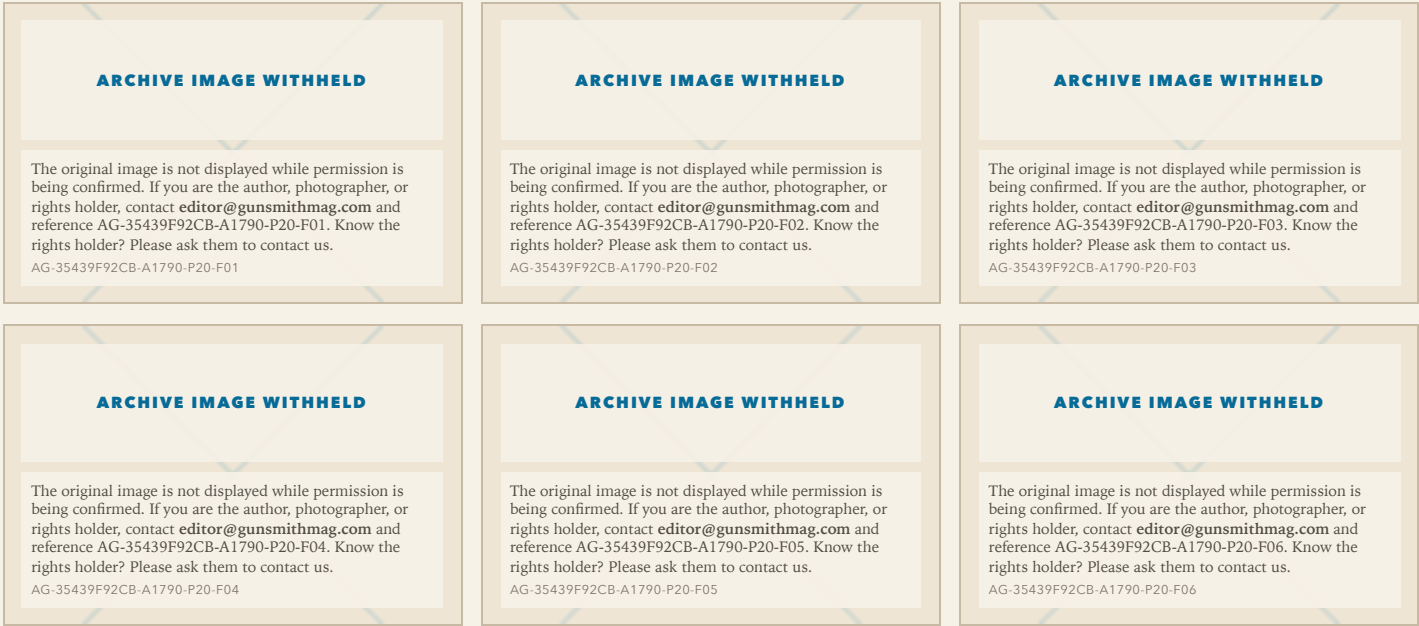
When it comes to trigger action there have been several complaints revolving around the short trigger action, pinched fingers, and a generally uncomfortable trigger face. While all hand sizes are not involved, the problem is more serious for some users. For those that need it, replacement triggers are available. I have used a unit from RTK Triggers (rtktriggers.com) with great success and entrust it in my other half's LCP. The procedure is simple. The trigger responds well, giving better control and comfort.

To install it, first triple check to be certain the pistol is unloaded and field strip it. I used a punch through the hole in the back strap to release the spring cap, which takes a little prying to remove. Next, use a loop of string

or a paper clip to grab the back of Below center: A punch is moved into position to remove the trigger pin and spring from the frame. Remember how they fit together. the hammer spring. By pulling up you will release the spring into the magazine well.

Using a small punch, drive out the two pins holding the trigger in place. This also releases the internal frame from the polymer receiver. The frame lifts out of the receiver. Release the trigger spring and remove the link bar (it is not quite a draw bar.) There is a hole in the back of the LCP's plastic trigger. Use a punch to push the trigger pin up. This allows the trigger, pin, spring, trigger pivot and trigger to be removed. Compare the old to the new trigger and proceed.

The next step is to assemble the trigger assembly and verify fit before installing it into the frame. Sometimes the trigger pin will not



Far It is not a large problem to modify the pin to fit the RTK Trigger conversion. Far center Far bottom Center insert into the trigger. Some factory pins, according to RTK, are larger than others. You may sand or file the

bottom last 1/8 inch of the pin and it will slip in readily. Very little work is done to accomplish this fit. The trigger assembly is then placed into the frame. The trigger spring tail will fall at five o'clock.

Press in the spring as you insert the trigger Below center: The frame is fitted into the polymer shell with the new RTK trigger installed.

THE RUGER LCP CONTINUED

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THE RUGER LCP CONTINUED

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Above center: The Ruger spring is captured with a spring and reassembled in reverse order. pin. Make certain that the trigger pin is fully seated. It may take some effort but do not use a punch or anything of that sort as finger pressure does the business. The link bar is installed next and the trigger spring is tensioned against it. Take a close look and locate the hammer block. Near the hammer block is a small hole on the right side.

The hammer block is pressed forward and a thin item such as a paper clip is inserted to keep the hammer block in the forward position. Feed the trigger into the frame first and the hammer spring will be in the magazine well. When the trigger is seated, release the hammer block. Partially insert the retaining pins. Ascertain that the trigger cycles

smoothly. If the action is correct, drive the pins in place. A slight tap is all that is needed.

Install the spring retaining pin using the string or clip and tension the hammer spring once again. Reinstall the spring cap. Once you have installed the slide, checking for function is pretty simple. After once again checking the chamber and the magazine well to be certain the pistol is unloaded, press the trigger. If the piece dry fires you are good to go. If not, back out the lower set screw in the trigger. If, when releasing the trigger you do not hear two reset clicks, run the top screw in sidewise.

I am getting to the point where I do not always hear these clicks as well as I should, but I can hear the Ruger's clicks just fine. Below

center: An RTK Trigger unit installed in a Kel-Tec pistol being adjusted with a slim Allen wrench. The Allen wrench is applied to the set screw and the trigger is adjusted. The best way to adjust the trigger is to set lower the set screw until the Ruger just barely catches and fires, then turn it counterclockwise a full turn.

Unscrew the top reset screw until the second reset point is audible. If the trigger does not reset you have eliminated too much take up. A failure to fire is the result to too much limitation of overtravel. Once the trigger is properly set secure the screws with blue Loctite. If the Ruger works properly but then begins to malfunction, the screws were not properly secured. AG

MEASUREMENT & INSPECTION

Reader Forum

BY AMERICAN GUNSMITH EDITORS APRIL 2014

ORIGINAL PP. 22-24

Shotgun and Back Issues I'm writing for help identifying a 12 gauge shotgun I recently bought. The shotgun is marked "National Fire- Arms Co." on the barrel, "12 GA." on top of the chamber and "Modified Choke" on the left side of the chamber. All the stamped lettering is surrounded by stars. The serial number is 1250XX. It is an exposed hammer pump shotgun and appears to be a take down model with a thirty inch barrel. It appears to be a copy of the 1898 Marlin and probably from the 1930s or 40s.

Any idea on specifics? Also, I'm looking to purchase all American Gunsmith back issues from February 2010 and earlier. Readers Doug Spooner and Charles Krall mentioned having entire collections of back issues for sale. I'd be especially interested in purchasing a complete collection of issues. Please call or write me if you have any for sale. Alton MO 65606-0068 Nothing in our files. Send a photo of the gun and your description to the National Firearms Museum, Fairfax, VA 22030 nramuseum.org).

If writing, include a stamped, self addressed return envelope. We're posting your contact info for readers with back issues to sell. AR-15 Function Issue I had a customer bring in an AR-15 that will not pick up around from the magazine despite ejecting the fire case. I have inspected every thing I know to check and nothing seems to help. The rifle is a kit gun assembled by my customer. When contacting the kit manufacturer, their only advice proved unhelpful, suggesting only that the gas tube was upside down.

The gas tube was installed properly and everything appears as it should. George Weiland George's Gun Repair From author Joe Carlos. I am the gunsmith that wrote the two part article published in the January and February 2014 issues titled, "Do You Have Gas?" It sounds like your

problem may be answered in that article. Parts guns such as your customer's rifle can be function nightmares as you are finding out! You say the rifle won't feed anew round.

It's possible for an AR to eject a fired case but for the bolt to not continue far back enough to pick up the next round in the magazine. Test if the bolt is locking back on the last shot in the magazine. If not, the bolt isn't cycling far enough rearward. The difference in distance isn't much but it can be enough to cause what you are describing. Other things to check, have you tried your own ammo in the gun? Try ammunition known to be reliable in AR-15 rifles as the customer's ammo may be weak.

Use a known good magazine. Of course, cleanliness and proper lube are always suspect. If none of these quick fixes work, go through my article point by point and rule out the other possibilities. As detailed therein, you'll find a number of things that can cause the mentioned symptoms. Pay attention to the section on checking bolt rings. After trying ammo, magazine substitutions and other quick fixes, substitute a lighter buffer spring.

Charley Gates Don't hesitate to contact me directly at Eventually we will figure this out! From George Weiland. The gas system inspected positive and the washers on the bolt were in good shape. I test fired the rifle again with a good magazine and a hotter load of good, known quality but the results were the same. After working through your suggested quick fixes I swapped out the buffer spring. Success! I immediately was able to run out three rounds so fast it would have made you dizzy.

Thank you for the personal help. I will be watching for more of your writings. Three Generations of S&W Semiautomatics I just read Wendell Deaner's article in the

February 2014 issue. Excellent! I have an M39-2—circa 1975— that I've always avoided taking the frame apart. Seems that elves and witchcraft were involved. However, my M39 bought new a few years back has a rear sight that's sort of "bayoneted" into the slide rather than drifted in.

Essentially, there's along piece of steel on the front of the sight that rides in a cutout on the top of the slide. It's not buried in it but more or less isn't there. To remove the rear sight, put a fine punch into the little hole at the tip of that piece of steel and pry it up a few thousandths. That allows rotating the rear sight to the left or right and eventually disengaging it from the slide. It'll just pop off at that point.

I don't recall the magazine disconnect spring being particularly stiff but it's under the sight. Other than firing with the magazine removed, it doesn't seem to matter whether that spring and plunger are present. The plunger pushes on a lever that serves to disconnect things if it can be moved down, which it will only do if the magazine is missing. Without the plunger it won't move downwards. Pretty trivial, but if you try to drift one of these out it could get interesting.

Removal of the safety lever is slightly different, too. Mine only requires a pin to drive the firing pin further up into the slide and then you can sort of work the safety lever out of the slide without further button pushing. The safety lever does lock the firing pin when in safe mode but it's free to move otherwise. I quit carrying it many years ago—it's just too big for the caliber compared to something like an S&W M&P 9mm or .40—but it's still great to shoot. Among other things, I'm a semi-retired rent-a-cop.

Very not-retired in 1975, though. Starsky & Hutch somehow got the local PD Detectives interested in the M39 and I was

READER FORUM CONTINUED

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able to piggyback on a bulk order for them. Hard to believe that my price was \$125 in those days. Stu Mulne SMM Associates Youngstown, OH From author Wendell Dwight Deaner. Thank you for reading American Gunsmith magazine and thanks for your kind comments about my article. The variations found on your guns do not surprise me.

For a firearm first introduced in 1954 and a manufacturing history stretching over many years—three generations and thousands produced—it is common to find such things and often not well documented. I printed your letter and have added it to my research files. Thanks for the info! Ruger And Remington I have a Ruger Mini-14 with the bolt locked in battery and a Remington 700 that drops the firing pin whenever the safety is pushed off. Is there something in the archives that relates to either or both?

Are all your old articles available on the Internet now? We hope there's no live round in the Mini. Better check it out. Point the rifle in a safe direction and pull the trigger. The live round, if present, should detonate. If the firing pin doesn't fall, the bolt is not in battery and the rifle failed to cock. That could be good or bad news. If the rifle didn't cock there's something wrong with the firing system. We can't be specific about what the something could be without the gun in hand.

We believe Ruger will provide a complete, factory assembled firing mechanism but will not provide individual replacement parts suitable for an off-site rebuild. A spent round might be stuck in a fouled or rough chamber. Another possibility, the stuck round was overloaded in its reloading and, when fired, expanded to jam itself tightly in the chamber.

As long as you're positive you're dealing with a spent round in the Mini, try inserting a wooden dowel or either an aluminum or brass rod down the barrel, into the case neck and into contact with its back end. Tap on

the muzzle end of the inserted dowel/ rod. It may be enough to start the case moving and allow its extraction via the bolt. Jim Thompson Was the M700 ever subjected to a trigger job? If so, the resulting pull might have felt great to a trigger finger because it was excessively lightened.

The mere movement of the safety or closing, not forcefully slamming, the bolt can jar the safety enough to disengage and release the firing pin. There's also the chance the safety is seriously worn and not capable of doing its intended job. Here again, the availability of individual parts is highly doubtful. In this case, ditto a complete safety. The Mini and Remington 700 have both been addressed in previous articles.

Whether or not those articles are among all past articles you believe are on the internet can be determined by calling Sig P220 I recently received a Sig P220 for cleaning. On disassembly, I found that right behind the hammer is a spring held in by a pin at the rear of the frame. I did not see the spring until I removed the hammer. My auto pistol disassembly manual shows it to be similar to the Browning BDA 45. It mentions the pin as a filler piece (#23) but nothing about the spring.

When reinstalling the hammer what position should the spring be in? If it's not in the correct position it can interfere with the installation of the mainspring. Joe Grisafi Jr. Eagle 1 Gunsmithing We've published to articles on Sig P-Series pistols. The first (October 1999) covers disassembly/reassembly. The second (January 2000) gets into troubleshooting. We believe the spring you refer to is the slide catch lever spring. One end of it fits in a hole in the locking block.

The opposite end activates the slide catch lever. We hope this helps. The matter of mainspring interference did not come up when Sig Arms provided inputs for the articles. AG

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