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ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

BULLET SEATING SWEET SPOT

FIREARMS GUIDE ONLINE • FEG P9R • .32 RIMFIRE CONVERSION • COUNTERBALANCING RIFLE STOCKS

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 150

DIGITAL ARCHIVE EDITION

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FROM THE ARCHIVE

Firearms Guide Online

BY AMERICAN GUNSMITH EDITORS JUNE 2016

ORIGINAL PP. 2

Impressum Media, publishers of the Firearms Guide DVD-based gun guide series, has made this resource a subscription-based online service. FirearmsGuide.com is a researchable, globally-accessible database of firearms, air guns, and ammunition for industry professionals and enthusiasts. The Guide offers complex search functionality by combining up to 14 key search criteria such as caliber, country, year, action type, stock type, manufacturer, etc.

Guns and ammo are presented with techspecifications, features, ballistic information and up to 12 high-resolution, zoom-able color pictures for each per model. Values of antique guns and prices of new guns are provided for traders along with thousands of printable gun schematics and parts lists for gunsmiths. The resource is updated 26 times each year with newly-released guns and more collectible firearms.

Currently, over 61,000 antique and modern firearms are featured, along with airguns, ammunition from 902 manufacturers worldwide, and firearm manufacturers from 50 countries. The service offers complete transparency as all models, manufacturers, and schematics are available to check out prior to purchasing a subscription so users know what is available before subscribing.

In addition, multiple level subscriptions range from Total Access to subject-specific sub-levels such as Handguns, Rifles, or Shotguns, or more specialized topics based on a single model. There is nothing to download or install and subscribers can login from any computer or tablet.

Features and specific, searchable items include a US-to-EU Ammo Caliber Chart with across reference of standard and metric calibers in the Ammunition section and a one click search for popular specific firearms such as 1911s, AR-15s and AR pistols, Kalashnikovs, derringers, pepperbox pistols, and Gatling guns. One click search functionality is available by manufacturer.

For example, selecting “Beretta” yields search results only for antique and modern handguns, rifles, shotguns, military, and air guns made by Beretta and organized in groups. Unlike search engines like Google, this makes complex, specific searching more easily accomplished. Guns, ammo, and ballistics information are cross-referenced. Finally, 650 printable targets are available for download. Impressum Media has a series of video demonstrations and tutorials for free.

See our American Gunsmith Video Category (AmericanGunsmith.info) for links.

PISTOLS

FEG P9R

While the P9R looks like a Hi-Power clone on the outside, this Hungarian-made pistol is anything but on the inside.

BY DICK MAHEU JUNE 2016

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The Hungarian P9R 9mm is a good quality DA/SA pistol manufactured by FEG (Fegyver es Gazkeszulekgyar), now known as FEGArmy, and was imported into the United States in large numbers from the middle 1980s to the late 1990s. There were three distinct models in the series. The P9R, a full-size model which is the subject of this article, the P9RK, a short model with a finger-style front grip, and the P9RA model, a lightweight, aluminum-framed version which was imported in relatively small numbers.

The P9R is the most common model encountered and will have either a fully rounded trigger guard or a squared back front, as is the example used in this article. I purchased this pistol new in 1994. You'll also see these listed as the R9 or the Mauser 90DA. A .45 auto version was made with a single stack eight round magazine and marketed as the FEG ACK or GKK-45. These instructions will generally apply to those models as well.

The P9R is a short recoil-operated pistol made with a strong and good quality frame, slide, and parts of alloyed steel. Its engineering was loosely based on the S&W Model 39 and 59. Contrary to what is spoken on the gun forums by the uninitiated, the parts of this gun are not interchangeable with the S&W guns! Unlike the S&W guns, this pistol does not have a barrel bushing. It's a good design as proven by the similar S&W and very little goes wrong with it if not abused.

For the professional gunsmiths, the ones you'll see come through your shop usually have been tinkered with in some way as to make them inoperable. The grinding of feed ramps and extractors, cutting coils off springs, and the like are similar issues. I have worked on these guns for nearly three decades and have never seen complete disassembly instructions in print. That's why I decided to write this article. Take down is relatively straight forward but reassembly has a certain degree of difficulty.

A competent gunsmith with ingenuity and a good knowledge of how these guns work should have very little difficulty in taking down this pistol and putting it back together again. The best way to learn how a gun works is to disassemble it completely while studying each part you take out and determining its function. I'll repeat here what an old time gunsmith told me when I was starting out in this business in the 1960s: If you can't put it back together the right way, then you have no business taking it apart!

Good advice. Field Stripping This gun is easily field stripped. Remove the magazine and pull the slide back to clear any cartridge in the chamber. Place the safety/decocker in the down position and draw the slide back until the back of the slide lock is even with the small cutout in the slide and push up on it to lock the slide back. While holding the gun in your left hand, push in on the protruding end of the lock on the right side of the slide. It should start the slide lock out toward you.

PULL OUT ON THE SLIDE LOCK WHILE HOLDING THE SLIDE AND FRAME STEADY

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against the recoil spring pressure. Some of these will be tight if not removed very much and a small, non-marring tool may be necessary to pry the lock out completely. Once out, hold the frame in your right hand and slowly release the slide assembly forward and off the frame. The recoil spring guide is locked back into the barrel cam. Slide it out slowly toward the front and control it and the recoil spring as you remove it from the slide. The barrel is now easily removed from the slide.

The pistol is now field stripped for inspection and routine cleaning and oiling. Simply reverse the directions to reassemble it. Be sure to put the safety/decocker in the down position before installing the slide. Detail Stripping We'll start with complete slide disassembly. After field stripping, remove the safety lever by pressing in on the firing pin with a small punch and rotating the lever downward while pushing in on the reverse end of the safety. It's a two-handed job.

Note, the safety plunger and its spring face outward at an angle in their slot and will launch into orbit if you don't cover the lever hole completely with your finger while pushing the lever out. This is a very stout little spring with a lot of force. Once the lever clears the plunger and spring, it

will stop. Remove the plunger and spring and then push in again on the firing pin with the small punch to clear the safety lever so it can be removed completely.

Restrain the firing pin and spring as you remove the lever. The firing pin spring is basically a shorter version of the 1911 spring and not very stout. To remove the extractor and its spring, drive the retaining pin out the top from the bottom of the slide with a small pin punch. Restrain the extractor and its spring when removing the punch. The rear sight can be driven out either left or right. The front sight is fixed to the slide by soldering. Reassembly of the slide is in the reverse.

When replacing the safety/decocker lever, it's necessary to hold the plunger and spring down in their slot with a tool that will not allow them to escape while pushing the lever by them. A tricky maneuver but certainly not impossible. I'll repeat some advice here that comes through the school of hard knocks. Unless you're a professional wanting to know how this gun works and comes apart, leave well enough alone.

The more parts are removed from guns, the looser they get, and the more likely of malfunctions occurring. Do not attempt to take

the recoil spring guide apart or you will be buying anew one if you can find one. It is a sealed unit with ball bearings on each end with a spring in the middle. For complete frame disassembly, remove the two metric (3 x 0.5) grip screws and the grips will slide off. Tap out the rear grip insert pin with the appropriate punch, either way.

Pull out on the bottom of the rear grip insert while restraining the hammer spring and cap, then remove them from the hammer strut. Push out the hammer axle pin from right to left, remove the ejector, hammer, and sear trip up and out of the frame. Note the orientation of the sear and spring for later assembly. Push the sear pin out right to left and remove the sear and spring downward out of the frame. Push the disconnecter down out of its slot in the frame.

It may have to be slightly oriented as it has a hardened pin that sticks out the right side at the top. Incidentally, this pin limits the travel of the sear trip in function. Drive out the trigger pin right to left. Remove the trigger drawbar and trigger drawbar plunger and spring back out of the frame. The trigger can then be taken out the top. On the right side of the frame in the trigger pin hole resides a small plunger and spring. It locks into

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a groove in the trigger pin to prevent movement of the trigger pin in function. Remove this plunger and spring. The magazine catch works on the same principal as the 1911 mag catch. Press in on the screw with a small screw driver and turn left to lock the catch spring and retainer and remove the assembly out the right side of the frame. I didn't mention the sear spring retainer pin as it is usually in tight and usually doesn't need to be removed. If it is loose in the frame, remove it so you don't lose it.

It captures the legs of the sear spring to give the spring tension against the sear. Reassemble the frame in reverse with details noted. To assemble the trigger assembly, fit the tabs on the drawbar into the trigger slots and drop the assembly into position from the rear of the frame. Leave enough room to slide the trigger drawbar plunger and spring into its access hole in front of the trigger. The front of the drawbar pushes in on the spring loaded plunger.

Push this unit forward with your right index finger while holding the frame with your right hand. Line up the frame hole with the left side trigger hole and start the small end of the trigger pin into the assembly. It should push in easily until it hits the trigger pin locking plunger. Turn the frame

over to access the plunger hole and use a small pin punch to force the plunger and spring up into their access hole while pushing the trigger pin all the way in.

You should hear the plunger lock into the groove in the pin. Make sure the trigger pin is locked in. Do this procedure exactly as I have outlined and it's a 30 second job! Drop the disconnecter into its slot from the bottom of the frame and then place a short slave pin through the sear and sear spring, remembering the correct orientation of the spring. The horseshoeshaped portion of the spring should lie against the bottom tab of the sear.

Place the slaved unit in line with its access hole and put the small end of the sear pin in from the left, driving out the slave pin and securing the sear and spring. If you have removed the sear spring retainer pin, drive the pin back through its access hole making sure to capture the legs of the sear spring under it. If you did not remove it prior, put the legs of the sear spring under it first before installing the sear pin and assembly. Installing the sear trip, hammer, and ejector is a tricky maneuver.

I like to use a pin punch of the right size, just slightly smaller in diameter than the hammer pin to accomplish this task. You

can also use a slave pin. Regardless, it will have to be long enough to protrude through the entire frame. Install the sear trip in its slot first and line up its hole with the right side frame hole. Install your pin punch through the frame sear trip holes to just capture the two together.

While holding the frame in your left hand, fully depress the trigger and place the hammer and strut into its slot as far as it will go when laid completely back. Releasing the trigger slightly, wiggle the hammer until it settles down fully. Look in the left frame hole with a small light to see if the hammer hole is lined up with the pin punch and slide the punch in to just capture the hammer. Now place the ejector in its slot and line up the pin punch with its hole.

This maneuver usually calls for wiggling the pin punch slightly to go through the ejector and out of the frame hole. The difficult part is over. Push the hammer axle pin in from the left side smoothly and without hesitation while holding the pin punch with slight pressure. Don't dislodge any of the three components. All three parts should now be lined up and installed properly. Pulling the trigger should move the hammer back normally against thumb pressure. Don't get discouraged if this

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1 Frame 2 Trigger Drawbar Plunger 3 Trigger Drawbar Plunger Spring 4 Trigger 5 Trigger Drawbar 6 Trigger Pin 7 Trigger Pin Retainer 8 Trigger Pin Retainer Spring 9 Disconnecter 10 Sear 11 Sear Spring 12 Sear Spring Retainer Pin 13 Sear Pin 14 Hammer 15 Hammer Strut 16 Hammer Strut Pin maneuver takes you several tries. It usually takes me two or three tries unless I get lucky the first time! It's now time to install the hammer spring, cap and rear grip insert.

The cap has a protrusion on the bottom that goes into a recessed hole at the bottom of the grip insert. This is a stout hammer spring but the engineering of the grip frame makes this about a 30 second maneuver.

Slide the spring and cap into the hammer 17 Sear Trip 18 Ejector 19 Hammer Axle Pin 20 Hammer Spring 21 Hammer Spring Cap 22 Rear Grip Insert 23 Rear Grip Insert Pin 24 Magazine Catch 25 Magazine Catch Spring 26 Magazine Retainer Catch 27 Right Grip 28 Left Grip 29 Grip Screws 30 Slide 31 Extractor 32 Extractor Spring strut and place the cap protrusion into the grip insert recess.

Push upward on the whole assembly until the sides of the insert clear the bottom of the frame and the assembly can be captured in the frame bottom. Make sure the top of

the grip insert goes into its slot at the frame top. Drive in the rear grip insert pin to secure the assembly.

This pin is grooved in the center to capture the cap protrusion to prevent movement FEG P9R (Specifications subject to change without notice) 33 Extractor Pin 34 Firing Pin 35 Firing Pin Spring 36 Safety Plunger 37 Safety Plunger Spring 38 Safety/Decocker 39 Rear Sight 40 Barrel 41 Recoil Spring Guide 42 Recoil Spring 43 Slide Stop 44 Magazine Body 45 Magazine Follower 46 Magazine Spring 47 Magazine Spring Plate 48 Magazine Floorplate of the hammer spring assembly during function.

The pistol frame is now reassembled. Reinstall the grips and grip screws, snug-ging them lightly. The grips are thin and easily cracked or broken. Check the function of the pistol while buffeting the hammer blow with a waded up shop rag. Simply reverse the field strip instructions to assemble the slide to the frame. To disassemble the magazine, unload it and depress the button in the center of the floorplate with a pin punch and draw the floorplate off the magazine body.

Be sure to restrain the spring and spring plate as you do this. Remove the spring plate, spring, and follower. Reassembly is in the reverse direction. Malfunctions Most

problems occur because of improper modification. Dirt, debris, and powder residue contribute to a sluggish pistol. Many can be directly attributed to the magazine. New, factory-original magazines usually work well in the P9R. When the magazine is locked in the pistol, there should only be slight movement upward of the magazine.

Any sloppy movement of the magazine will lead to misfeeding. It's a good practice to keep a couple of known-good magazines on hand for troubleshooting purposes. Some parts for the P9R are available from Numrich Gun Parts Corporation and Jack First, Inc. These are the first two sources I go to for parts. These instructions for disassembly and reassembly have worked well for me over the years, however, knowing the ingenuity of gunsmiths and guncranks, your particular methods may work better for you.

Be my guest to do it whatever way gets the job done safely and successfully. I welcome feedback from readers on my articles. I have been at this game for 48 years and there's not a day that goes by that I don't learn something new. It's what makes this field of endeavor so great! AG

MACHINING

Bullet Seating Sweet Spot

Determining ideal loading maximizes ammunition effectiveness.

BY JOE CARLOS JUNE 2016

ORIGINAL PP. 7-11

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Original caption: Below top: A front bore guide is helpful.

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Original caption: Below bottom: Loosen the little (about 3/8") brass knurled nut located on the 5/8" x 3/4" sliver collar (roughly to the right side) on the overall length gauge. Pull out the gray plastic insert to allow a bullet to be inserted in the neck of the dummy cartridge casing on the extreme left. sizes to find the a "sweet spot." We're looking at the last one now.

Using a machine rest, I am able to find the bullet seating sweet spot for every gun I build. It takes me about a half day of range time if I have ammo already loaded and nearly a full day if I am forced to load while I proceed. If you don't have a machine rest or are much more skilled at bench rest shooting than me (almost anybody is) just provide guidance for the owner to perform their own range testing. Talking about "sweet spots" can become very esoteric with terms like nodes, null spots, barrel harmonics, etc.

Even though I have a general understanding of this, these essays can be difficult to follow. Regardless, the goal remains to discover whatever it takes to get groups to be the tightest. Group shrinking is often done by varying bullets, propellants and the amount charged, actually changing the harmonics of the firearm (such as Browning's Ballistic Optimizing Shooting System), or changing bullet seating depth while observing group

Exercise caution when inserting a cleaning rod down the bore from the muzzle end. The rod is used to push the Stoney Point gauge out the back of the receiver.

Combining techniques can help but various restrictions may prevent using them. I'll also cover long seated ammo with 80 and

90 grain boat tail bullets used for single-fed slow fire events, though the techniques can be adapted for magazine-fed ammunition. Finding the bullet seating sweet spot begins by taking measurements of the cartridge rim to bullet ogive.

You'll need an overall length gauge (mine is from Hornady), a dummy cartridge casing that screws on the front end of the gauge, comparator that attaches to one of the legs of your caliper, a caliber-specific insert for the comparator, quality calipers measuring to 0.0005", a quality cleaning rod of proper length, ten bullets of the lot intended to load, and an immaculately clean bore and chamber. Exercising caution, insert the cleaning rod down into the bore a short distance from the muzzle end.

It is helpful to have a front bore guide. Insert one of your ten bullets into the neck of the dummy casing attached to the front end of the overall length gauge. There is a collar on the shaft of the overall length gauge with a little knurled brass-colored nut on it. Loosen it to release the gray plastic inner section and pull that back far enough to allow the bullet to drop down in the neck a little further than you expect the loaded round to finish up at.

I use the collar as a grasping point to insert the whole unit up through the receiver and into the chamber. Push everything up until the shoulder on the dummy casing hits against the shoulder of the chamber. Maintain some forward pressure to prevent the dummy casing from backing out. Maintain your hold on the collar with the index finger and thumb, then move the inner plunger forward, pushing the bullet further forward in the chamber.

Stop pushing when you feel the bullet come in contact with the back of the throat. The object is to locate the very back of the throat, not some point 0.002- 0.003" further forward. Without letting up with the forward pressure, lock the knurled brass nut down hard enough to trap the plastic plunger and save the setting. This procedure may be awkward at first but it becomes easy enough. Using a front rod centering guide, keep the cleaning rod traveling straight and carefully push it further into the barrel.

It will eventually come into contact with the bullet on the end of the dummy casing and push the entire unit out the back. Zero the caliper, open the jaws, and place the dummy casing

BULLET SEATING SWEET SPOT CONTINUED

ORIGINAL PAGE 8

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Above center: A hand press with competition bullet seating die is handy to use on the range to vary cartridge length. This saves trips back and forth to the loading bench between test groups. With the rim flat on the naked leg of the caliper and the bullet "nose cone" extending down into the silver bullet insert that is attached to the comparator clamped to the other leg of the caliper. Close the jaws of the caliper.

I like to give everything a little "squiggle" while doing so to make sure the back of the dummy cartridge is sitting flat on its caliper jaw and that the bullet is straight seated in the bullet insert. Maintain light forward pressure on the thumb wheel of the caliper and record its reading to ten thousandths of an inch (four decimal points). Repeat these steps for each of the remaining bullets and average them. This is the estimated chamber length. Pull the cleaning rod back out part way between each reading.

If it is inserted too far into the bore the bullet will abut against the end of the rod instead of the chamber throat, confusing the readings. Also, loosen the brass nut each time and push each of the ten bullets just into light

contact with the back of the throat. Consistency is important. Don't hesitate to confirm with multiple caliper readings. When moving the overall length gauge from the back of the receiver to the caliper you might accidentally dump a bullet out of the dummy casing.

No problem, as your reading was locked in by tightening the knurled thumb nut. I'm often asked how far to seat 80 or 90 grain bullets for best accuracy. No two guns are alike and is the reason each will have a unique bullet seating sweet spot. On top of that, each of us exerts our own unique pressures on the measuring tools and may see slightly different readings. My average sweet spot tests indicate a 0.004" jump with boat tails but I have firearms all the way from 0.000" to 0.010" of initial jump.

Before live fire testing, note that any time we attempt to influence barrel harmonics or optimize ammo it is critical to test with the gun fired exactly the way it is going to be fired in real life. Different bolt carriers or adjusting their weight, or anything touching the barrel (flash suppressor, gas block, "bloop tubes", etc.) can induce a change. After getting the

ten bullet average chamber reading, I subtract my average sweet spot jump of 0.004" to get my target length.

I head to the test shed with a tray ammunition with the bullets seated long, a hand press with a competition bullet seating die, and calipers. I adjust the die to final seat my bullets as close as possible to the target length and spin them on a concentricity gauge, marking an index of the high side. I measure the cartridge rim-to-ogive distance of the first ten rounds and record the average. I label that column of readings with the die setting so I can repeat it if need be.

Due to variations in bullet profiles, thicknesses of brass in the neck of the cartridge, and the way propellants may pack in the case, not all rounds come out with the same length reading and may have a variance of 0.002" long or short. Longer ones are closer to the throat. If too long, pressures increase and you'll see it on the chronograph. A maximum velocity spread of 30 to 40 fps for ten rounds is good. Absence of fliers in the target group is another good indication.

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In addition to the gun or upper, each customer gets a sample box of ammo set to the sweet spot. Author keeps a file copy of one round in an envelope for his records. I use a Bob Sled magazine and push every test round into the chamber a uniform depth. My studies reveal this can shrink group sizes by 13.8%. As soon as I finish shooting that first group I go down range and label it along with the die setting used. I return to the shed and look at the length average from the first ten rounds.

If I was short of my target length I reset the die to seat 0.002" longer, or reset the die shorter if the target length was long. The procedure is repeated for the next ten rounds. If the second group is better, the gun is telling me I am going in the right direction and I adjust seating 0.002" more. If not, the gun is telling me to adjust seating depth in the opposite direction.

As long as my groups are shrinking I continue to adjust seating and testing until I find a seating depth where the groups begin getting fatter. Depending on what I am seeing on target, I may try to refine seating depth by going in 0.001" increments around the tentative sweet spot die setting. Once the final sweet spot group is established, I average the ten rounds producing that group to find the sweet spot length.

I load a box of twenty rounds plus one extra and measure each of them to find which ones hit that sweet spot length to within 0.0005".

No error allowed in those. I save one of the spot-on rounds and seal it in an envelope with the die setting, date, and customer name or gun number, powder type and weight to use as a template for future loading.

The remaining spot-on rounds are marked and given to the customer to save as a permanent record and template for die settings along with load data used and a copy of the final machine rest test groups. Having done the testing, it's up to the shooter to duplicate these handloads. No ammo, including rounds seated to a found sweet spot, will perform its best if concentricity is ignored.

For the Army Reserve Team, we issued the exact hand press and die I used when establishing this test work to the shooter receiving the rifle. Besides following good loading procedures to reduce and measure concentricity, the die setting was left in place and paint marks put on as witness marks with load data written on the press handle. Using Team ammo, I even used Loctite on the die body threads so it couldn't back out and mess up the final seating depth.

We could do this because the Team loaded their ammo with mass-purchased common components and maintained consistency from year to year in neck tension and other factors that can cause differences in average seating depth. Few individual shooters can do this. Tune Ups The sweet spot seating length will last for the life of the barrel. With

boat tail bullets the shooter doesn't have to lengthen the rounds to compensate for throat erosion. In fact, he doesn't even have to ever take a Stoney Point reading.

However, it is helpful for the shooter to have a tune up from time to time and update his seating sweet spot on an annual basis. The throat erodes forward and bullets jump longer distances. Unless those bullets are lined up perfectly with the axis of the bore they will be deformed and not shoot well. The tune up process starts by selecting ten bullets from the lot used. Measure and average the readings as done previously. Subtract 0.004" to find the expected tune up target length.

Adjust the seating die as done previously. This tune up keeps the gun shooting well at long range until the bullet has been moved so far forward that the neck doesn't have sufficient grip. As bullets are moved forward significant distances (we're talking hundredths of an inch here) velocities will drop off. Watch for this on the chronograph. It is not unusual to bump up charges 0.2-0.4 grains while performing tune ups. I've found muzzle velocity in .223 Remington changes about 10 fps for every 0.1 grain of powder.

High Power competitors often shoot two different bullets. Most AR-15 shooters use a 77 grain bullet seated to function in a magazine for their 200 and 300 yard stages and hand feed a longer, heavier bullet at

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600 yards and beyond which might not fit the magazine. Single fire ammo has been the subject of this article and many shooters judge the performance and longevity of barrels based only on 600 yard performance. We can improve accuracy with long range ammunition as discussed; this isn't as useful with magazine-fed cartridges. Yet, 60-75% of most match aggregates are fired with the shorter cartridges and it's imperative this ammo performs as well.

The Wylde chamber I often use jumps magazine-length 77s about 0.090" when the chamber is new. As the throat moves forward due to erosion, jump length increases with it and performance can soon drop off. Those shooting only 80 grain bullets at the 600 yard line can extend the total performance with both 77s and 80s by using a chamber with less throat as from Compass Lake or Accuracy Speaks. Those chambers also yield higher end round counts as long as you don't booger bores with rough cleaning.

My machine rest tests show that the Compass Lake chamber shoots ten shot groups of magazine-length 77 grain bullets 23.3% tighter than the longer Wylde chamber. As throats erode with use be certain to

pay attention to concentricity and straighten cartridges as needed. When barrels are near their end it is not unusual for 300 yard accuracy to degrade before a fall off in 600 yard performance is seen.

It's also worth noting that merely taking anew set of measurements on bullet seat depth after a competitive season and subtracting the jump from the previous year will not automatically establish anew sweet spot. This will get you to within 0.003" but that's too much error. It's a good start point but you'll still need to test with varying lengths in 0.001-0.002" increments to find the updated sweet spot. Bolt gunners in some shooting disciplines sometimes "soft seat" their ammo.

They load their boat tails a little long with modest neck tension and chamber each round singly and very slowly, carefully closing the bolt. This has the bullet stop in the throat while the brass moves up around the back of the bullet as everything is locked up. Some Service Rifle shooters tried this with hand fed ammo seated long and it did not work. Most military shooting teams load their long range ammo hot with new Lake City cases and crimped-in primers.

Soft seating raises pressures and results in blown primers. To make matters worse, the blown primers frequently become lodged in the barrel extension, preventing the bolt from locking up, or under the trigger. This version of soft seating is done by laying the round on the top of a magazine and tripping the bolt catch. Having the bolt to fly forward like that is better called hard seating! Bullets are jammed hard into throat and any need to clear the rifle pulled the bullet, spilling powder into the action.

This also causes groups to open up. Using across section of Team uppers, I machine rest tested ammo seated to the sweet spot compared to "hard seated" ammo to prove this. VLD Bullets Very Low Drag bullets offer some advantages but are high maintenance. Finding their initial sweet spot works like boat tails but where boat tails are jumped some distance, VLDs work best pressed into the throat slightly. To find a VLDs sweet spot, start with the same steps above but begin with about 0.005" of jam into the throat.

Adjust longer or shorter as tested above.

BULLET SEATING SWEET SPOT CONTINUED

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Above and The thing with VLDs is that you don't just load up a case of them for the whole season and kick back. Remeasure after thoroughly cleaning the gun after each range session. That average measurement gets longer as the throat erodes. Adjust seat depth when loading the next batch or rounds accordingly. This is "chasing the throat" and keeps the same amount of bullet jam as the throat dimensions increase over time. This isn't difficult but requires attention to detail and meticulous record keeping.

The Army Reserve Team tried some 90 grain VLDs for long range before Berger came out with their very good and user friendly boat tail. While our shooters posted good 1000 yard scores, chasing the throat was a pain in the neck. With boat tails, I find a sweet spot close to the throat. I hear guys talking about finding sweet spots at much longer jumps, sometimes from 0.020-0.040". I've tested this but found it wasn't better then using 0.010" of jump or less.

Not as close as VLDs, but a big jump seldom yields optimum results. As you can tell, I like to quote numbers. I have literally found this bullet seating sweet spot for hundreds of uppers. My records show I've shrunk group sizes by at least 20% on average by doing so. Each gun is different but this has always yielded some improvement. The sweet spot

seems to allow a powder charge variance of 0.3-0.5 grains and works in a variety of temperatures without causing problems.

It has been many years since I have seen a sweet spot ten shot group go over MOA on my machine rest with most into the 1/2-5/8 MOA range. Plotting sweet spot jump lengths on a graph was a nearly perfect bell curve. Most guns liked 0.004" of jump (measured by my hand) and an equal number preferred 0.005-0.006" jumps as those liking 0.002-0.003" better.

Guns wanting 0.007-0.010" were even more rare than those few wanting only 0.001" Different people will exert different pressures as they push the bullet into contact with the back of the throat for measurement so your average sweet spot jump may be a little different than mine. Keep good records when you test this. Knowing my own average jump as 0.004" saves tons of time.

It is not unusual to fire an initial test group seated at 0.004", then fire two more test groups adjusting in 0.002" increments to see them get fatter and correctly conclude the rifle is yet another preferring my normal average. Magazine-Length Ammo Military shooting teams usually load their long range 80 and 90 grain ammo but buy commercial 77 grain loads for the short lines. The handloads generally shoot tighter groups than even the best commercial 77s. That is a penny above the group.

Since the ammo is already assembled at the factory, "repair options" are quite limited. Fixing run out using a cartridge straightening tool is one very effective method of making factory ammo perform better. I wondered if a version of the custom seating depth methods could work with magazine-fed ammo. Obviously, you can't lengthen factory magazine-length ammo but you can seat deeper if needed.

Select 10 rounds of ammo from a box of the lot you intend to use, deal with their concentricity, and test fire as a control. Measure the factory cartridge and adjust the die to seat it 0.002" deeper. Seat the bullets, deal with their concentricity, and fire a test group. Continue to seat deeper in 0.002" increments as groups shrink and then start getting fatter.

Unfortunately, this method is very lot specific and changing lots of even identical brand ammo can change the sweet spot depth, though not likely to be more than 0.004". Vary your seating depths back and forth in .001 or .002" increments until you find the new sweet spot. Handloaders using the same lots of components won't likely need to adjust their sweet spot for years, provided powder and loaded rounds are properly stored.

Most magazinelength ammo will sweet spot with less than 0.010" of adjustment and won't increase pressure. AG

PEOPLE & COMPANIES

.32 Rimfire Conversion

opportunities and challenges.

BY PAUL MAZAN JUNE 2016

ORIGINAL PP. 12-14

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Original caption: Bottom: The forend wood came complete with notches from a previous owner. Did some family rely on this rifle to fill the pot at dinner? The only real drawback to putting the gun into shooting condition was that it was chambered in an obsolete .32 rimfire. While .32 rimfire ammunition can occasionally be found, I wanted something that was more readily available and reloadable. The first problem was a loose barrel-to-receiver fit that allowed the barrel to wiggle back and forth in the receiver.

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I recently purchased a well-used No. 4 Remington Rolling Block because the price was right, I like Rolling Blocks and I thought I could resurrect it. The gun was in reasonable condition but had seen some hard use as witnessed by the 24 notches a previous owner had carved on the forend. I can only assume those notches represented squirrels or rabbits but knowing boys as well as I do, it's possible they mark tin cans, rocks, or most anything else he hit with the gun.

I tightened up the take down lever so it engaged the barrel correctly and held it firmly in place. Upon removing the forend I discovered that the forend extension that goes into the front of the receiver to help stabilize the forearm had been broken off. I was faced with either drilling a 3/4" hole the length of the forearm and gluing a dowel in place or finding an alternative method of attaching an extension.

As the forearm wood is only an inch wide, any error in centering the hole or keeping the hole perfectly straight was going to break out of the wood. I have done plenty of stock repair and published several articles about it, so I used one of my favorite repair tricks to make the

extension. I took a 3 1/2" length of 9/32 fully threaded rod and drilled a 3/8 hole in the forend. The size of the threaded rod and hole to seat it in is not critical provided the hole leaves plenty of room for adhesive to hold in place.

I sealed the joint between the receiver and the forend with modeling clay and mixed up some Acraglas from Brownells (#081-003-002AK). After a couple drops of brown dye and a liberal coating of release agent on everything I didn't want the Acraglas to stick to, I was able to pour a perfectly fitting extension. The original liquid Acraglas filled the oversize hole in the forend, locking the threaded rod to the wood and with the rod extending out of the forend and into the receiver.

I am certain the new extension will be there forever. The tight fit obtained by using the receiver as its own mold eliminated all the forend play. There are many things to consider anytime you want to adapt any gun to a different cartridge. Collectability and how the alteration affects collector value, action length, bolt face dimensions, extractor specs, and action strength are just

.32 RIMFIRE CONVERSION CONTINUED**ORIGINAL PAGE 13****ARCHIVE IMAGE WITHHELD**

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This will have to be moved to line up with the center of the chamber to fire a centerfire cartridge. Above center: After coloring the breech face with Dykem, a cleaning rod with a brush was run down the bore from the muzzle to mark where the centerfire pin should be located, a few that will limit your choice of a suitable cartridge without extensive and expensive rework. In this case, choices were limited.

Due to the age of the firearm and the fact that the .32 rimfires were originally black powder cartridges later upgraded to smokeless, any of the hotter .32 centerfire cartridges had to be ruled out. My first thought was that this would be a neat little package in the new .327 Federal Magnum but a bit of re-

search revealed the working pressure is around 45,000 PSI. Even the .32 H&R Magnum has a chamber pressure of 21,000 PSI, far in excess of the 15,000 PSI of the typical black powder cartridge.

Pushing this old gun up to pressures three times what it was designed for was simply not someplace I wanted to go. If the barrel had been bad or the gun in pristine condition I might have put a .22 liner in it for a .22LR conversion even though the once ubiquitous .22 seems to have recently become an out-of-production cartridge in my area. Joking After covering all surfaces except the threaded rod and the end of the forend wood, the barrel and forend are assembled and the Acraglas poured.

Below center: Modeling clay fills the receiver and Acraglas will be poured through the hole to fill the void underneath. If not sealed, the liquid Acraglas will run out of even the smallest gap, aside, since the bore was in nice shape it was less expensive to use the barrel as is. That eliminated the choice to the .32 S&W family.

By converting the rifle to centerfire and reaming the chamber to .32 S&W Long, a cartridge that also started life as a black powder round with a chamber pressure of 15,000 PSI, I'd have a nice, low-recoiling rifle using a more available cartridge in the same chamber pressure range the gun was designed for. The actual conversion process was relatively easy. The first step

.32 RIMFIRE CONVERSION CONTINUED**ORIGINAL PAGE 14****ARCHIVE IMAGE WITHHELD**

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Be sure to use plenty of release agent or you will no longer have a take down model. The Acraglas will stick to the metal, permanently attaching the forend to the receiver. after disassembly was plugging the old rimfire firing pin channel in the breechblock. There are a couple of ways of doing this. If you don't have access to a lathe capable of turning anew firing pin, cut apiece of steel rod the same diameter as the original firing pin.

Solder it in I look to be pretty happy with the group at 9 o'clock to the bullseye. the old channel or use Brownells Steel Bed (#081-040-003AK) to fill any voids and hold the rod in place. It is necessary to use a steel rod to fill the firing pin channel because the conversion requires drilling anew channel for the firing pin. Using a filler like Steel Bed without the steel rod causes the drill to bend and follow the old channel instead of cutting through the side of the old angled channel wall.

To mark the location of the new firing pin hole in the face of the breech block I coated the face with Dykem and reinstalled the breech block. I then ran a cleaning rod with a bore brush down the bore from the muz-

zle and twisted it when it contacted the breechface. That left a mark on the breechface in line with the center of the bore. I removed the breechblock and used a center punch to mark the spot so the drill wouldn't wander when drilling the firing pin hole.

Measure the tip diameter of the firing pin and choose a drill bit a few thousandths larger. Drill the firing pin hole in the face of the breech to the same depth as the length of the small section of the firing pin. Now comes the tough part. Select a drill a few thousandths larger than the diameter of the firing pin body (the large diameter) and drill a hole from the rear of the breechblock to a depth that will just intersect with the smaller diameter hole.

Fit the firing pin into the new firing pin channel and adjust the hole depth until the firing pin protrusion is 0.049 to 0.051. The case diameter of the .32 S&W Long is different than the old .32 rimfire originally chambered and a call to Brownells or Dave Manson Precision Reamers (mansonreamers.com), will have a new reamer in your hands in a couple of days.

The results area sweet little .32 S&W Model 4 Rolling Block that is fun to shoot and is capable of putting a serious dent in the local squirrel and rabbit populations. With a muzzle velocity of 718 fps and a bullet energy of 112 foot-pounds, it is not a deer rifle and it really won't do anything a .22LR won't do but it has put an old dust collector back to work and it is accurate enough at 50 yards to put a smile on my face when I shoot it.

Of course, you can now reblue, refinish, and/or customize the gun to your taste. In this case I elected not to refinish and allowed the old girl to show her age. I'm not sure why but old guns have a certain dignity and the bumps and bruises give them a personality. Unless they are rusted or broken I like to have guns with personality. Whichever you choose, your last chore is to remark the gun with the cartridge it has been converted to.

After all, the gun has already outlived its previous owner and will also outlive me. The next person that it is passed down to won't know what you have chambered it for unless you tell them. AG

RIFLES

Counterbalancing Rifle Stocks

In the accuracy arena, where 1/8 minute of angle makes a difference, overall rifle balance can play a huge part. Among the more useful aids in achieving stock/rifle balance is additional weight in the buttstock.

BY NORMAN E. JOHNSON JUNE 2016

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The counterpoised rifle stock has particular application in the benchrest rifle. Here, the rifle rests on special supports, usually consisting of sand-filled bags as an interface. The front support is positioned along the forend of the rifle and the rear sandbag support immediately forward of the buttplate. As a heavier barrel is installed on the rifle there is an increased uplifting of the buttstock with some loss of rifle stability and control. Adding some form of weight here does the trick.

Some use clay as a filler in those composite stocks which are This amount of weight just forward of the buttplate adds counterweight to the heavy barrel target or varmint rifle. Below center: A 9/16" wood bit powered by an electric drill is used to make the stock holes for the stock counterweight. hollow. Wood stocks allow a different choice in counterpoised weight control. In this case, more dense weight like lead or tungsten area good choice. Here is how I did it with excellent outcome.

The rifle I worked on was a Savage Model 112 single shot with a walnut stock. I had gone over the bedding and converted it to a switch barrel chambered for .25-06, .257 Improved, and .243 Winchester with a 1:8 twist. Midway, as I was testing the .243 1:8 Douglas barrel that was still in the break-in stage, I was experiencing quarter-inch five-shot groups at 50 yards. This is exemplary accuracy in any circles but it would get even better.

As the rifle was still in the break-in period I had it in a padded vise with the buttplate looking right at me. I decided to remove the buttplate and drill a pair of deep, 9/16" holes for installation of lead shot as counterbalance weight. Lead shot makes for excellent stock weight material and I installed half pound of lead shot into two holes under the buttplate. I calculate the required half-inch hole depth to be five inches, which is a quarter pound per hole.

A full 35mm film container holds a half pound of lead shot, which was divided out between the



two holes. The simple formula for calculating volume ($\pi \times \text{radius squared} \times \text{depth}$) showed a volume comparison between the film canister and the two 9/16" holes. I used a sharp wood bit with a lead hole to make the holes. A small funnel was used to pour the lead shot into the holes and thin tape used to hold the shot in place. The screw-on buttplate was

put on Using lead shot is much less complicated and does the same job. and the rifle was ready to shoot.

While shooting, a noticeably improved balance was felt with the heavier buttstock in the rear sandbag. It doesn't take much to help. I always lift and tap the stock gently into the rear bag each shot, which helps prevent vertical grouping errors. Added weight in the buttstock helps here too.

The new balance point on the Savage Model 112 rifle with its medium-length action, 26.5" number 7 Douglas barrel was now two inches forward of the receiver ring with a 6-24X B&L Model 4000 Elite scope and Talley Manufacturing scope mounting system. (Continued on page 19)

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should always be considered with any changes made in the stock, barrel, or scope mounting system. Cost is low to get the job done and it can work wonders in your shooting. AG For extreme accuracy, sometimes the least obvious things can make the difference.

Proper gun balance The balance point of this Model 112 Savage target rifle with 26.5" heavy barrel has been moved back to two inches forward of the receiver with the added half pound of lead shot. 243 Winchester rifle is little short of perfection. 3.

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SOURCE 19

RIFLES

Soft Metal Vise Jaws

hatched steel jaws and a swivel base. Here's how to make a set of jaws out of copper or brass.

BY NORMAN E. JOHNSON JUNE 2016

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My heavy-duty, six-inch, swivel base bench vise helps me perform so many tasks I couldn't get along without it. Among the many uses are cutting, drilling, and holding parts for assembly and disassembly. The vise is also used for the removal and installation of rifle barrels in conjunction with special tooling for the purpose.

A great amount of holding pressure can be applied with most machinist bench vises with one-inch torque screws and 3/4-inch handles. 6 Hi-Duty Vice with sixinch jaws

and swivel was made in England and has served well as a gunsmith machinist vise for more than a half century. When the jaws are harder than the part being held in the vise, damage can occur. The new jaws are 1/8" wider and slightly thicker.

Steel vise jaws with cross hatched notches have tremendous non-slip holding power as parts are held but parts being held in steel jaws often incur nasty crush marks or damage imparted by the roughened jaws designed for the very purpose of holding. Parts are of-

ten ruined or damaged when this doesn't need to happen. A set of quick-change copper or brass jaws will prevent this and are an easy solution.

While I have used varying types of vise jaw padding such as plastic, aluminum angle metal, and fiberlike material, they all lack the ability to precisely hold small parts being worked on. I got the idea to make up a set of quick-change copper jaws which can be exchanged in a minute as the need arises.

SOFT METAL VISE JAWS CONTINUED

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Above center: Each 5/16" diameter hole is beveled for an 82degree slotted screw head. Screws are set just below a flush fit. An Allen head screw may an even better choice, further speeding up the jaw changing process. No cross hatched roughening is applied to the copper jaws. Making The Jaws When I made a set of jaws, I looked around my metals supply (I never throw anything away) and discovered a length of 1/2" x 1 1/8" copper stock that seemed made for the purpose.

Sometimes we really luck out in finding just the right part for the job at hand, saving usa trip for additional supplies. In this case it was just a matter of final fitting to make these

quick-change copper jaws. Below center: A belt sander is used to dress and true up the original steel vise jaws. After cutting to length, I found the jaws fit more squarely with a bit of precise milling. This was accomplished by placing one of the jaws in the milling machine with one end raised 0.025" and marked accordingly.

Holes were then drilled using the original jaws as templates. An 82-degree bevel was used to countersink the 5/16" self-centering screws just below flush fit of the slotted screw heads. The new copper vise jaws were about 1/8" above the original jaws, just as I wanted. I then used a belt sander to true up

the top surfaces of the new copper jaws and checked them with a steel square. Everything looked good.

Gunsmiths can make up a pair of copper or brass vise jaws at very low cost which will hold and protect many types of different parts. Common padding material often used for this purpose doesn't allow precise holding of parts. Though the copper jaws can be damaged by holding items that should be clamped with steel jaws, the quick-change feature is a real plus. No gunsmith should be without them.

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Original caption: Top: A steel square is used to check for a square, flat surface following dressing with a belt sander. Fitting the new jaws was quick and easy. These can be exchanged in a minute. AG

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MAINTENANCE & REPAIR

Working .22 Rifles

Providing good service for small, common repair jobs can help build your gunsmith business.

BY ROBERT K. CAMPBELL JUNE 2016

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Not long ago, a group of friends, fellow gunsmiths, and I discussed the most common repair jobs we received and some of the little tasks that routinely supplied bread and butter for our families. The consensus was one of the most common repair jobs were some type of repair work for .22 rifles. Many of the jobs were straight forward while others require more effort. Despite any differences in specific requests, we all agreed on the reasons for the frequency of this particular repair job.

There are literally millions of .22 rifles. Many are not well made of good material. Most were designed to be sold as cheaply as possible. In numerous instances, the owner will insist on a repair job worth at least as much as the rifle because he is attached to the rifle, especially if there's a sentimental attachment if the rifle was a gift received long ago with many memories of good small game hunting. Some gunsmiths might be impoverished without the .22 rifle to keep them busy.

When addressing the .22 rifles, I combine my own experience with the shooter's complaints. Before investigating a malfunction,

be certain the firearm is clean. Always begin with a clean and lubricated firearm. Powder ash, bullet lubricant, and lead residue are culprits of malfunctions, especially with rimfires. This build up slows operation down. In some cases the bolt face may become so filled with crud it causes problems with chambering a cartridge.

A light firing pin strike or misfire and ammunition-related issues are not uncommon. As an example, some target grade loads may have a longer shoulder length than standard loads. With the longer shoulder length and a tighter chamber the user may enjoy good accuracy but will also need to clean the firearm more often. With a thorough cleaning and ammunition issues addressed, look to mechanical problems. I recently worked with a rifle that had suffered a sudden degrade in accuracy.

I fired the rifle with Winchester Dynapoint ammunition and this normally-accurate load was all over the target. The problem was traced to peening around the muzzle. I don't know if it was caused by rough handling or a drop from a tree or truck, but the muzzle looked rough. This was cleaned up with a small file and the rifle was up and

shooting with likenew accuracy in short order. This was a simple fix and an obvious one to a trained observer.

Another common problem is a chamber scratched, gouged, or Below and damaged by dry fire. Rimfire firearms are especially susceptible to this type of damage if the chamber is made of soft steel and less expensive .22 rimfire chambers are often as soft a steel as the maker can get by with. Manufacturers can get away with using softer steel alloy with the .22 because it's a low pressure cartridge. Dry firing such guns can kick up burrs and the firing pin can be damaged as well.

Lacking the soft brass rim that is normally supposed to be there, cushioning the blow, dry fire in an unloaded rimfire allows the nose of the firing pin to strike the metal of the chamber with full force. To make matters worse, once burrs are kicked up the metal is often work hardened. A reamer used to polish out these burrs may actually effect the opposite chamber wall. The Tom Menck .22 Chamber Ironing Tool is designed specifically to swage out burrs in .22 chambers caused by dry firing. Brownells lists

WORKING .22 RIFLES CONTINUED

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22 Chamber Ironing Tool. A thorough cleaning had the extractor working properly. Far Often, a simple cleaning is all that is needed. it (590-009-022) for \$24.99. It works by rolling the peened area back into place and is the preferred fix. Insert and turn, or tap against the burr until the chamber is smooth and round again.

It can be pushed in and turned with its own handle, a Magna-Tip or a small wrench, threaded into an 8-32 cleaning rod and pulled into the chamber, or driven into the chamber

from the rear with a small punch. While the Menck tool is the way to go in this type of work, I have It actually appears to have a chip out of it. Below center: Sometimes a file will do the business quickly for minimal burrs around the chamber edge. also used along tapered punch to remove firing pin dings from the chamber.

With the rifle secured in a vise, the punch is inserted into the chamber, aligned coaxially with the rifling, then struck with a light hammer. The punch is driven in but should be

easily removed. Rotate the punch 180 degrees and repeat. The goal is to move metal back into place, not to lengthen the chamber. As a final option, moving the rough metal back into its original place can sometimes be done with a grinder at low speed running the drill. Low pressure is the key.

As for the chamber itself, a few scratches and gouges in the chamber are common. They seldom give trouble. The raised areas around the

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chamber mouth caused by dry fire are more serious and I don't sweat chamber scratches as much as damage by dry fire. The chamber is sometimes gouged when a stuck case (caused by poor cleaning) is dug out of the chamber with the point of a pocket knife. Yes, it happens often. Wear can loosen the extractor and inflict damage on the chamber. A cartridge case may rupture into the extractor groove in extreme cases. The extractor should be carefully examined.

Cleaning is often a simple fix for a worn extractor as extraction cannot be positive with dirt or foreign matter under the extractor. Rimfire ammunition can be messy as the outside lube and soft lead projectiles common with .22 ammo leaves residue in the chamber. Extractor cuts are pockets for collecting such material. An extractor out of full engagement is a recipe for malfunction. Beside needing a thorough cleaning,

the ejector may be broken, moving too slow, or poorly pinned. The axis pin may be broken.

If the rifle does not extractor eject then it is a good idea to check the extractor and the leading edge closest to the barrel for a raised area (I call it a "new rectangle") caused by excess wear. Check the contact area of the angled claws for obvious wear and replace as needed. For an inexpensive fix, the extractor may be peened with a hammer. Once lengthened, it may be recut. Such fixes are done when the part is very expensive, unavailable, or a low-cost fix is of primary importance.

While both the extractor and the ejector must be close as possible to specifications, the firing pin must be perfect! The firing pin must strike a hard blow to fire the cartridge. Check the firing pin for proper length, the firing pin spring for proper tension, as well as cleaning out grit, dirt, powder ash, and left over lubricant from firing

in the firing pin track. Detachable magazines and springs are best served with replacements. Tubular magazines are another matter.

The tube is sometimes damaged but most often it is a simple magazine spring that makes the difference in function. There are many types. The simplest solution is to order the longest spring. The longest rimfire rifle magazine tube spring I know of is for the Marlin 39. A weakened spring usually loses about an inch of its free length over time. Lacking a specific 22 rimfire ammunition is more reliable than ever but will never burn as clean as centerfire rounds.

Cleaning lead and powder debris is essential. factory or aftermarket replacement, clip the Marlin 39 magazine spring to just over an inch longer than the spring to be replaced and test. This often works as-is. Jobs on rimfire rifles may be inexpensive and mundane but they are a bread-and-butter staple for many working gunsmiths. AG

MAINTENANCE & REPAIR

Reader Forum

BY AMERICAN GUNSMITH EDITORS JUNE 2016

ORIGINAL PP. 23-24

Winchester 1400 I contacted the conglomerate that has Winchester and Browning now and their techs had no idea on where to start. My customer has a Winchester 1400 and the action release is made of plastic and needs to be replaced. I have the metal replacement but am not sure on how to remove the old plastic one. It appears to be held in place by a plastic "plate" that extends down and around the magazine tube. How do I remove the release?

Other than an increase in the number of magazine throats from one to two, we aren't aware of any other design change in the 1400. You can find take down instructions for the 1400 in The Gun Digest Book of Shotguns Assembly/Disassembly. Model 1903A4 I have a Model 1903 with a serial number in the range of 3,386,xxx. This should make it an A4 but it is an '03 of Remington manufacture. It has the dovetail for the rear sight but the sight is typical '03 and is located forward in '03 fashion. Any insights on this?

In 1943, due to the lack of and sudden urge to acquire a sniper rifle, Remington was directed to modify the 1903A3 to be able to mount a scope. The 1903A4 was the result. As a sniper rifle, it wasn't a great success. In the first place, the A3 was never meant to serve as a sniper rifle. To allow the scope that was applied initially, a Weaver of the day, the entire front sight assembly was removed, neutering the gun for any purpose other than that for which it was originally intended.

Complicating things further, the scope mount prevented loading the rifle with a clip and it became a single shot, only gainfully employed by a proven marksman instead of being the primary weapon carried into battle by a platoon, company, regi-

ment, or division of infantry. Though we found no mention of an A4 with its rear sight still positioned forward as per an A3, we suspect you are not the rifle's original owner and it has been reworked by persons unknown.

Be that as it may, we recommend The Springfield 1903 Rifles by Lt. Col. William S. Brophy. Maverick 88 I started to disassemble the trigger housing for a Mossberg Model 88 Maverick and am having trouble getting the sear spring back in. Also, my customer wants the safety button switched for left handed use. Can this be done? Are there any assembly instructions available for this trigger housing? Ron Jester John D.

Savely Skeeter Creek Gun Repair Though widely considered a clone of the Model 500, there is a major difference between the safety systems in the respective shotguns. The M500 is tang mounted, thumb operated to the front and back. The M88 safety button is mounted inside the trigger assembly and operated via lateral movement. The trigger assembly of both guns is very similar except for the M500 safety linkage leading downward from the tang.

You will find disassembly instructions for the trigger assembly of the M500 in The Gun Digest Book of Shotguns Assembly/Disassembly and Firearms Assembly: The NRA Guidebook to Shoulder Arms. Mike Lawrence Of course, the trigger assembly has to be removed from either gun first. This has ordinarily occurred previously during field stripping. Examine how the M88 safety is installed. Its basic composition includes a small spring, a very small detent ball, and the button which has a detent in which the ball can seat.

Once those elements have been removed, most are installed for right hand shooters unless otherwise requested by the end purchaser to be reversed. The detent in the button must face upward. Be careful you don't lose the spring or detent ball in the process. We just have to ask: How come so many left handed shooters don't order a left handed gun in the first place? In aside-ejecting gun like the 88 or 500, the spent hulls will be repeatedly flung out immediately in front of them.

Marlin 39A I have acquired an old Marlin 39A but can't get it apart. Following the instructions in the owner's manual, I loosened the take down screw, gripping the forend in one hand and the stock in the other, and tapped the end of the barrel on a rag-covered surface but that didn't work. Is there something about older 39As or some other villainous mechanical contrivance obstructing my pleasure? I believe this rifle was made in the 1940s. R. L.

Wurdack LMA Ranch Nothing villainous, except the 39A, derived from Annie Oakley's pet Marlin 1878, hasn't mechanically meaningfully changed. It's always been a take-down lever gun. You're having trouble because you have to do more than merely loosen the take down screw. It must we backed off until wobbly. Don't worry, it won't pull all the way out. Now you should be able to separate the action from the stock. See the NRA Guide to Firearms Disassembly and The Gun Digest Book of Rimfire Rifles Assembly/Disassembly.

The latter is easiest to follow if detailed disassembly of the receiver, including the firing mechanism, is required. Cold Rust Bluing I recently read about cold rust bluing in NRA Firearms Sourcebook and

READER FORUM CONTINUED

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this would be the perfect process for me. What is your recommended cold rust bluing solution? When Bob Brownell first opened his gunsmithing supply business, bluing materials were among the first he offered. Today, the business he created in a small Iowa town has grown to a number one status and remains the best source for information and products for bluing firearms.

Among them are cold rust bluing, While this type of finish is the most labor intensive of all bluing practices, it has the deepest roots and is capable of producing the most exquisite, seemingly bottomless finishes and is still employed by custom gunmakers as well as superior, top-end producers such as James Purdey & Sons Ltd. Remington Versa Max I have a Remington Versa Max with the extractor broken off.

I have removed hundreds of other extractors from different makes and models of firearms, but this bolt head does not appear to have an exit hole for the extractor retaining pin. There is an offset hole on the opposite side of bolt head from the extractor retaining pin, but it does not open to the retaining pin that I can see. I have tried using several different punches to get the pin to move without any luck. Can you advise me what to do to remove the retaining pin?

William Artz There is a blind offset hole above the pin itself. With a punch exactly matching the diameter of the pin and slightly angled toward the extractor, start the pin downward. When enough of the pin has been exposed beneath the bolt head and below the extractor, the pin can be removed from the bolt head with smooth jaw pliers. Reline Savage/Stevens 1915 I have a Savage/Stevens 1915 and want to reline the barrel. Can I do this in .22 Magnum or would it would be better to reline it to a .22LR?

The rifle is close to being over 100 years old. This causes us some concern about crystallization of metal. If this is true in the receiver to a significant degree, you may have to abandon the .22 Magnum due to its increase in pressure over the .22LR. Accurate determination of the degree should be determined by a metallurgical lab. Further, the .22 Magnum is much longer than the .22LR and any liner installed would have to be chambered for it.

Brownells Gun Parts Source List, available free upon request, also reveals a few sources for relining. Unless the metal test permits otherwise, stick with the .22LR. Slugs And Chokes A friend of mine went into a "big box" gun store to purchase an improved cylinder choke insert for shooting lead and sabot slugs. He was told he doesn't need one, just take out the modified choke that came with the gun. Larry Black I maintain he runs the risk of fouling the choke threads.

He seems to think the store "expert" is right and the slugs won't foul the threads. Please settle this for us. Clayton Thornber Steel is harder than lead. When lead come into contact with steel it is going to get a shave. The whiskers from that shave can be deposited in rifling and elsewhere, such as choke threads. The deposit can be cleaned out but great care must be taken. Choke threads can be very fine depending on the choke maker and the thickness of the shotgun barrel into which they've been cut.

Paul Kester The sabot slugs your friend intends to use provides some defense against lead shaving. However, the strength of that plastic providing the defense is also softer than steel. It, too, can be shaved to build up in choke threads. The positive side of plastic build up is it can be readily removed with a solvent and bronze brush, neither of which are harder than steel. AG

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