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AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

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INSIDE THE ARCHIVE

BETTER AMMUNITION

Q-SERIES STEALTH • SAVAGE MODEL 1899 • BUILDING HOME SECURITY SHOTGUNS • COLT NEW SERVICE

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 148

DIGITAL ARCHIVE EDITION

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PEOPLE & COMPANIES

Q-Series Stealth

BY AMERICAN GUNSMITH EDITORS APRIL 2016

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Gary Quesenberry is the CEO of Q-Series, LLC (qseriesllc.com), a veteran owned company that makes a unique, minimalist holster. The company's Stealth holster is a minimalist, ambidextrous, tuckable, extreme low profile, IWB (Inside The Waistband) concealment holster that can be worn with or without a belt while allowing easy reholstering.

In addition to being one of the first companies to offer a holster for the Glock 43 when it came out, Stealth holsters are also available for the Glock 42 and standard size, as well as S&W M&P full-size and Shield models. Q-Series Stealth "After years of carrying concealed and never finding that perfect concealment holster, I finally decided that if you want something done right, you just have to do it yourself!

As a competitive shooter and firearms instructor for the Department of Homeland Security, carrying concealed is not only apart of my job, it's away of life." Quesenberry's design process was based on comfort,

low price, and function. The first prototype was built in December 2013 and demonstrated to several friends on the range. Several of them were associated with a few retailers in the area and their interest was sparked.

A week later they put in a combined order for 200 of the holsters. "At the time I was making holsters in an old modified toaster oven I picked up at Walmart," Quesenberry says. "I got rid of the old toaster and stepped up my game considerably." The popularity of the holster grew and he officially formed Q-Series, LLC in March 2014. Galls.com, a police and public safety uniform and equipment supplier, started carrying Q-Series holsters and it become one of the top selling products in their catalog.

A number of other retailers across the country have started carrying them as well. Military and Law Enforcement purchasing directly from Q-Series receive a 10% discount. The company's website also has a series of product and shooting demonstrations.

RIFLES

Savage Model 1899

BY MARK R. HOLLENSON APRIL 2016

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I recently had the opportunity to clean up and refinish the metal work on a Savage Model 1899 rifle chambered in .30-30. The gun had been sanded previously and had a number deep pits and patches of rust all over the gun, inside and out. It appeared that someone had made an attempt to clean it up but gave up. No wood was supplied with the metal. Being the dedicated gunsmith I am, I decided to take on the old workhorse.

The customer was warned that the deep pitting and deep scratches would likely still be on the gun but it would be blue again. He seemed to be elated that I did not hesitate to tackle the job. Besides, I liked this old beauty despite its condition. Back at the shop I began a detailed inspection and a search for disassembly information in my large library of gun manuals and how-to files. While I didn't possess a shop manual for the 1899, I did have a Savage Model 99 break down.

This particular model had differing design and procedure, so I began the process using what I had on hand as a starting point and figured out the rest on my own. The design is simple enough and since a man had made it, well, I figured I could make sense of it. And since it had to be completely disassembled for a blue job, I had to take it down further than any manual I likely would have had on the subject.

After closely inspecting the gun and making sure it properly functioned in its current state of assembly, I began disassembly. I began by opening the lever down all the way with the bolt to the rear. Next, I removed the bolt stop screw and bolt stop. This screw can be found at the back of the receiver while looking downward from the top. There is a second screw next to it. This is the trigger spring screw and has along trigger spring under it.

Both screws were removed and the bolt stop and trigger spring came out slick as a whistle. During reassembly, you will notice that the trigger spring screw head is larger than the bolt stop screw head. Next, I removed the lever screw and bushing located in the middle of the finger lever. The screw comes out first from the left side of the action. A large, flat punch can be used to rest on the outside edges of the lever bushing and gently tap the bushing out of the lever from left to right.

During reassembly, notice there is a small detent lug at the top of the bushing head. This lug must be reinserted into the slot on the finger lever so the bushing will not spin during bushing screw tightening. The entire bolt assembly was removed by pulling it to the rear and wiggling it out of the action. During reassembly of the lever into the base of the bolt there is a noticeable slot milled in the rear side of the bolt that the finger lever round lug/pin rides in.

Perform a quick reassemble to test fit that part to check how it fits in the groove of the bolt and observe how the lever lug fits into the milled slot in the bolt. Insert that lever pin lug in the bolt slot at the same time as reinstalling the bolt into the frame for proper fit. Remove the trigger pin from the frame by using a small punch and by tapping the pin out from the receiver, left side to right. Notice the trigger is hooked onto the sear bar in an elongated notch.

Either wiggle the trigger out of this notch and remove it from the bottom of the action or remove the sear bar screw that is located on the rear left side of the receiver. This screw/pin comes straight out and has a smooth area on the pin where the sear bar rides when assembled. Once the sear bar screw is removed the sear bar and trigger can be taken out all at once.

Now that the trigger and sear are out of the way, remove the finger lever by turning it slightly until the round pin lug on the end clears the receiver inside the slot where the trigger once was. While turning the lever, pull downward to remove the lever from the bottom of the receiver. With all of that out of the way, remove the trigger safety/lever lock at the rear of the action.

This is the small lock that locks the action closed at the rear of the finger lever and prevents the trigger from being pulled to the rear (safety). At first look, it appears

SAVAGE MODEL 1899 CONTINUED

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Above center: Brass rotary spindle ammunition counter that lets the shooter know how many rounds are in the magazine. Capacity is five rounds. The screw above the “window” is the magazine rotary spindle assembly retention screw/pin. The last screw viewed holds the sear bar in place. Moving it forward locks the lever and blocks the trigger from being pulled, as if it has a screw in the rear of the lock located at the rear most end of the receiver.

However, it is not a screw, only along pin that was split and bent outward some to fit firmly into the hole in the receiver. Take a flat pin punch the same diameter of the end of that pin and firmly push it forward into the frame. No hammer is needed normally. This will allow the lever lock to be pushed out and forward to clear it from the frame housing hole. At this point most of the frame parts have been removed.

Moving It looks like a screw but is just around rod that was split so it could be bent out the end to tighten the fit in the action as needed. Below center: Lever lock/trigger safety removed from the action. Note the split. It goes back in the same way. The round end on the right fits over the rotary spindle screw head still inside the action. forward, we get to the area that has warnings published about in every manual I have concerning not removing the magazine spindle assembly.

However, because I did not have a 1899 Service Manual, I opted to ignore those manual warnings! I could see that there was attrick to disengaging this assembly from the receiver. To get started, I found the magazine cartridge stop bar (cover) that is directly over the brass magazine spindle inside the action could be removed. I pushed that top bar backwards enough to clear the large screw head located inside the action behind the rotary magazine spindle.

Once it cleared that screw head, I tilted the bar up, wiggled it forward and up out of the top of the action. Keep a close watch as this bar has along V-spring behind it. The V-spring has a hooked end on it and that fits inside around slot in the bar just removed. Take note how it fits in place and how it removes for correct reassembly. I normally reassemble as I go just to see how it goes back in place. This next part starts with what not to do.

I first began by trying to remove the rotary spindle assembly by unscrewing the cap screw located at the front of the receiver forward of where the rotary magazine is inside the action. That screw did not budge. It didn't matter as I quickly found the correct method of removing the entire spring loaded rotary spindle assembly. First, remove the screw/long cross pin that is located on the front outside left of the receiver. This long screw has a threaded top screw with along straight pin that pins the round ro-

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This is also where you place a large screwdriver and tap gently to remove the entire rotary spindle magazine assembly forward out of the receiver after removing the assembly cross pin/screw from the left front side of the receiver. Above center: Brass rotary spindle in proper placement. You'll need to rotate the collar to line up reinsertion of the rotary spindle magazine screw pin/screw through the receiver. tary spindle collar into the frame.

The collar has grooves in it that will be used to line up the collar inside the front of the action, keeping it in place when reassembled, and keeping spring tension on the rotary brass cam for loading rounds into the magazine. With the receiver screw/pin out, place along screwdriver in the screw slot head found inside the receiver behind the rotary magazine spindle assembly. Tap the screwdriver from the rear forward and drive the entire rotary assembly out of the receiver towards the front of the action.

Make certain the brass rotary cams do not get hung up inside the action while tapping the assembly out the front of the receiver. In other words, do not beat on this assembly to remove it. Take it slow and use oil if necessary. The round collar at the front of the receiver will begin to move and slide out towards the front of the receiver. Note that the screw head where the screwdriver is placed to begin

tapping forward will completely clear the hole in the small plate located inside the action.

Once the unit has been removed, disassemble it by first grasping the round steel collar in aluminum vise jaws (or your hand if that works) and unscrewing the screw from the back of the brass rotary spindle. Note, this screw is left hand threaded. Turn it in the right direction to unscrew it (clockwise). Once the screw is loose, pull it out of the brass rotary spindle and set aside.

Remove the front screw (the one that I could not budge earlier and did not need to at that time.) This is a cap screw head and it holds the rotary spindle collar in place. With those removed, pull the rotary spindle collar off and locate the coil spring. When removed, this spring has a leg on each end of it. These legs will be fitted into small holes drilled just for them when reassembly occurs. There is one hole inside the brass rotary spindle and the other one near the center of the round steel collar.

The rotary magazine spindle assembly is now completely disassembled. I will describe the reassembly later on. In order to disassemble the bolt, start by removing the rear hammer bushing screw. This screw can be located on the left top side rear of the bolt. The other end of the screw is visible on the other side of the bolt. Unscrew this and pull it out, freeing up the mainspring rod and firing pin assembly for removal.

Next, turn the hammer/mainspring bar and firing pin assembly upwards about 1/4 of a turn and wiggle the hammer assembly out to rear of the bolt. The bolt has to be turned during disassembly and reassembly because there is a lug pinned in the top center of the bolt that the hammer assembly must negotiate to be properly installed. Once the hammer assembly is removed, disassemble the mainspring and firing pin as needed.

When reassembling the mainspring rod and firing pin assembly, grasp the bolt housing in your less dexterous hand and use your thumb to pull down on the "C" or claw-shaped bar. Insert the firing pin/mainspring assembly with the lug pointing up, pushing into the bolt until approximately 1.5 inches is sticking out, then turn the mainspring assembly down a quarter of a turn so it interlocks with the spring loaded bar at the front center of the bolt.

This slight turn allows full insertion of the mainspring/firing pin assembly. Pull down on the claw-shaped bar and depress the mainspring enough to insert the mainspring bar firing pin assembly screw/pin. I recommend you try it a couple of times at disassembly to get a feel for the fit up. Once the mainspring bar and firing pin assembly is removed, remove the claw-shaped bar and spring that actuates it. Remove the second screw (the one below the mainspring/firing pin assembly screw in the bolt.) There is a small

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The spring has a leg on each end that gets inserted into a small drilled hole inside the brass spindle and the round steel collar. When together, you simply wind the assembly to place tension on the spindle then reinsert into receiver. Above center: Sear and trigger engagement when properly assembled. coil V-spring under that "C" actuator. Carefully remove the screw and hold onto the actuator bar so the spring does not jump away.

Once out, one end of the coil V-spring has a 90 degree bent leg on one side that is noticeable. This small leg fits into a hole drilled in the actuator bar. The coil fits in the milled slot in the "C" claw bar and the longer straight leg of that same spring rests in the bolt groove milled in the bolt body when reassembled. The extractor can now be removed using a small pin punch. Below center: Rear left side of the bolt.

The top screw when removed allows you to disengage and remove the mainspring/firing pin assembly. The bottom screw enables removal of the "C" claw bar on the opposite side of the screw/pin. Push the pin out from the bottom to the top of the bolt body. The extractor serves as its own spring, so no additional spring will be found behind it when removed. Notice a lug in the top center of the bolt. This lug is held in place with across pin in the bolt and is also under spring pressure.

This is the same lug that you had to negotiate the mainspring rod and firing pin assembly around to disassemble and reassemble and it can be removed with a small punch as well. Just keep an eye on that pesky spring! Reassembly can be accomplished by reversing the order of these disassembly instructions, as I provided recommendations for each part when removed or disassembled.

When reassembling the rotary magazine spindle assembly, begin by inserting the spring inside the brass spindle, turning it until the leg fits down inside the small hole. The spring drops down when the leg finds the hole for it. Next, insert the long screw inside the brass spindle from the rear and inside of the spring. Place the round steel collar over the screw and insert the exposed leg of the spring into the small hole provided in the steel collar.

Continue by inserting the screw into the large diameter ring by threading counter-clockwise. Once seated, start turning the round steel collar with your less dexterous hand while holding the brass rotary spindle in your strong hand. Wind the spring until there is proper tension on the brass rotary spindle. I wound it until it stopped, then backed the rotary spindle out one full turn which provides enough spring tension when the rotary magazine is fully charged. If too

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Original caption: Top: Removal of the mainspring/ firing pin assembly after the screw/ pin has been removed. From here, rotate the mainspring rod lug up about a 1/4 turn and withdraw it from the bolt. tightly wound, the rotary spindle will stop before the magazine is filled. Hold the assembly and insert into the face of the receiver. Make sure the loading ramp on the brass rotary spindle is in the top dead center (up) position when inserting so it can rest under spring pressure on the inside of the magazine frame area.

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While inserting the assembly, I held the round steel collar and brass rotary spindle under spring pressure with my weak hand thumb and finger. I then pushed the unit into the receiver from the front and aligned the end of the long screw head so that it fit through the hole in the plate at the back of the magazine box area. You may have to tap the round steel collar bushing with a nylon or brass hammer to get it in place.

Once in correct position, screw the cap screw on the front of the round steel collar, threading it onto the end of the long screw inside the brass rotary spindle. Note, this is also a left hand thread. Once on, the cap screw can be used to turn the round steel collar so that one of the grooves lines up with the receiver pin/screw hole. Once aligned, insert the receiver screw into place and the spindle magazine assemble will be operational. Test the spring tension and ensure it moves freely.

Notice there is a small hole (window) on the left front side of the receiver. In that window you will see numbers marked on the brass rotary spindle. Those numbers correspond to the number of rounds in the gun when loaded. Pretty neat idea! This gun did not require any repairs or service, so no technical instruction pertaining to working this gun was included in this write up.

I realize that these instructions are long and seem very complicated but they will walk you through a stepby-step process for tearing down and reassembling this old beauty. I actually had an old owner's manual totaling two pages for this gun, however, those instructions didn't have as much depth as I went into here. That old manual is sufficient for routine cleaning, not full disassembly and reassembly. The Savage M1899 is a great, well-made, classic rifle.

HOPEFULLY THIS ARTICLE WILL PROVE USEFUL IF ONE CROSSES YOUR BENCH. AG

SHOTGUNS

Building Home Security Shotguns

Here's how to convert a standard pump-action shotgun into a functional security shotgun.

BY NORMAN E. JOHNSON APRIL 2016

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While some law-abiding homeowners shun the idea of having a gun in the home for protection, for those that desire this protection a good, reliable defense gun can be an important part of home security. A standard pump-action shotgun can be a perfect choice. Chances are good you already have such a shotgun or can readily obtain one. Here is how to make the conversion to have that gun totally fit your needs. Most will agree a 12 gauge pump shotgun is ideal for home defense.

The steps needed in making the conversion are quite easy. After finding the right shotgun I examined it for safe and proper function. My plan was to On top, the barreled action. From left center, old recoil pad with one inch of cut-off stock, new recoil pad, buttstock with pistol grip sawed off, aluminum pistol grip handle, and 7 3/8 inch of cut-down barrel.

It has all the required features for the job. cut the barrel down to twenty inches, shorten the stock, add a better recoil pad, and install a "full grasp" pistol grip handle to replace the existing one. The converted shotgun was an older Sears Model 20 five-shot pump 12 gauge. The original stock and forend were made of maple or birch. It had a rubber recoil pad that had become hardened with age which no longer served the purpose. I started by adding a pistol grip, replacing the cut-off wood pistol grip cap

BUILDING HOME SECURITY SHOTGUNS CONTINUED

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Above center: End mill is used to precisely mill the slot on the underside of the stock in preparation for the threaded metal base used to solidly retain the pistol grip handle. The sunken base is held solidly in place with J-B Weld and a solid 82-degree flat head screw. This is where the original pistol grip was removed, positioned immediately rearward of the trigger guard.

This involved forming a flat surface immediately behind the trigger guard where I mortised in a solid metal support on the underside of the stock. This turned out to be a fairly major task but resulted in a solid grasp of the gun while shooting. The entire pistol grip (handle) can easily be taken off by removing

a socket head retaining screw. I perused the Brownells catalog in search of a replacement pistolstyle handle.

They had all manner of side pistol grips but not a complete pistol grip-style handle, so I decided to make one and install it. Following much shaping and fitting, the new grip handle from two flat pieces of aluminum evolved. As a finish for the aluminum pistolstyle handle, I rasped it to shape and rough buffed it with a coarse, steel brush. As an after thought, I decided to finish the pistol grip handle with 3/16" dot indentations surrounding both sides of the grip.

A total of 64 dots did the trick and the grip looked even better. Below, counterclockwise: In the formative stages of making the pistol grip handle, an end mill is used to shape the laminated aluminum part. I then worked on the recoil pad and stock finishing. The stock was shortened a full inch and anew Limb Saver recoil pad was installed. This new pad absorbs up to 70% of the felt recoil, Brownells sells them, and they're made in USA.

The new pad required fitting according to my regular routine, which takes a well-spent hour. At over 14 inches, the pull length was too long for most women. The blond stock was then stained and refinished with Birchwood Casey Tru-Oil.

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Above center: Finished pistol grip handle ready to be bolted to solid metal base on the stock. This major part accounted for a good share of the work in modifying the home security shotgun. This part can be crucial in handling and firing the gun in self defense. The next step was barrel shortening and re-crowning. By law, shotgun barrels can be no shorter than 18 inches in length and the overall gun length no shorter than 26 inches. This must be observed as a shotgun is altered.

I decided to make the barrel 20 inches in length, which would still render it useful as a hunting gun for both slugs and fine shot. Of course, the Hand also can be positioned with the thumb above the grip and with thumb

and fingers surrounding small of the stock and pistol grip. This would depend somewhat on how gun is positioned relative to shoulder. Sometimes, a hasty point-and-shoot with the gun well below the shooter's chest level is required.

Revisions include barrel shortening, recoil pad replacement with buttstock shortening, addition of a pistol grip handle, and stock finishing. Few guns offer the versatility of a pump shotgun as a home protection arm. gun would now have an open choke and produce a less-dense shot pattern. The old gun had aged gracefully and I decided not to re-blue it. We assume a huge responsibility when taking a gun into the home for security and protection.

It is very important that all those who may need to use a gun for this purpose know precisely how to do so. Each person should understand the laws of personal and property protection and seek proper instruction in these areas. Of course, all guns should be kept where they are not accessible to children or anyone not permitted to use them. AG Specifications Make: Sears, Roebuck Model 20 Gauge: 12 gauge, 2 3/4" chamber Action: Five shot, pump, Length: 47 3/4" to 38 1/2" Weight: 7 lbs.

Barrel: 28" to 20" Choke: Full to Cylinder bore Side thumb safety, four lb. trigger

MACHINING

Better Ammunition

shoot bad ammo well enough to win.

BY JOE CARLOS APRIL 2016

ORIGINAL PP. 11-16

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I was disappointed when I accepted the position of Armorer for the Army Reserve Shooting Team and machine-rest tested all 135 of the Team's match AR-15 Service Rifle uppers. I found only 39 would shoot 10 shot groups of minute of angle using Team-issue match ammo. That was unacceptable and it took an enormous amount of work to correct. I had to not only rebuild the guns but make the ammo "more better" as well.

When I left the team I had cut average group sizes fully in half and every one of those 135 uppers would shoot sub-minute machine rest groups. While our focus usually isn't on ammunition and reloading, we want our customers to be happy with the guns we build for them. None of us can build guns accurate enough to compensate for bad ammo. Concentricity and management of run out is cheap and effective. It also works The Porter's Precision tool (left) and Hornady model (right) also straightens our rifle cartridges.

Below center: Graphic by ISM Services. Notice how the base of the top bullet, seated straight in the casing, will be perpendicular to the axis of the bore while the base of the crooked seated bullet (bottom) is

tilted at an angle.. on factory and hand loads, rim fire and centerfire ammunition for rifles and pistols.

Gun Tec Dictionary defines bullet run out as, "The measurement (usually in thousandths of an inch) that a bullet and/or case are misaligned in relation to the centerline or axis of the entire case." Our Team was dealing with concentricity since the 1980s. We didn't have the options available then as we were competing with M14s and issued Lake City M852 .308 ammo. I still remember waiting in long lines before day-break to receive ammo. We then brought it to the Assembly Line and "spun" it on a concentricity gauge.

The least straight cartridges were used for standing, better stuff for 200 and 300 yard rapid fire, and the best saved for 600 yard slow fire. How does concentricity influence accuracy? First, boogering the bullet. Imagine the bullet slamming into the back of the barrel off center. That bullet is going to be deformed and never fly true. The poorer the concentricity and the further the bullet travels before entering the rifling, the greater the deformation damage with most of it at the front of the bullet.

Another issue is cocking the base of the bullet. For maximum accuracy, the base of the bullet needs to be perpendicular to the bore. During the instant a bullet exits not perpendicular to the bore, gas pushes unevenly and tips it slightly off center. Nonconcentric ammo will bullet bases arranged randomly and any given round may tip in differing directions, opening the group and causing fliers. Poor quality control in bullet manufacture can cause non-squared bullet bases, though match bullets are high quality.

Crooked seating is a bigger concern. The mirror image of a bullet base cocked at an angle is a barrel crown machined less than perfect or damaged. This also causes gas pushing unevenly on the base of the bullet at the instant of exit and tilting the bullet slightly off course. I was not aware of any cartridge straightening tools in the 1980s so we sorted them. Today, there are tools that can straighten crooked ammo. Porter's Precision and Hornady make two examples.

AMMO WITH RUN OUT THAT IS STRAIGHTENED SEEMS TO SHOOT

BETTER AMMUNITION CONTINUED

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Original caption: Top: AR-15 machine rest test at 100 yards. Note how group sizes tighten and the severity of fliers is decreased as concentricity becomes better from top left through the bottom groups. At top is a horrible group from ammo with 0.005-0.006" of run out. To the right, the same gun and ammo but with an average run out of 0.0041".

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Original caption: Bottom: It took only minutes to sorta box of ammo to achieve the bottom group. The rifle was thought to be "shot out" due to poor 300 yard scores. The shooter was spinning 600 yard ammo only. The throat measured a 0.25" jump with magazine-length 77 grain ammunition, where brand new Wylde chambers jump the same ammo 0.090". Ten randomly-selected rounds produced the top group.

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22 LR concentricity gauge from Nielson Brothers Arms. Culling or straightening reduces the problem but the best cure for bullet run out is to not have any in the first place. When loading ammunition take steps to produce the most concentric cartridges possible. Start with competition bullet seating dies, such as from Redding or Forster. They have a spring-loaded sleeve as well as ammo made straight.

If I start with a factory-made cartridge with six tick marks of run out and I straighten it to only two, ten-round groups will normally be as good as the same cartridge that originally measured two tick marks without correction. I do recommend avoiding ammo that is over corrected for match use. If I get too heavy on the straightening tool and push the run out too far the other way, even if finally corrected I'll just use that round for standing practice.

Long range ammo seems to shoot better with light neck tension. Go too light and bullets can become loose in the case necks after straightening so I recommend just a little more neck tension (0.0015") to avoid this. All things being equal, older guns that have longer throats due to erosion require a higher standard of concentricity control than shorter throated guns.

The further a bullet travels before engaging the rifling the further from the center line of the bore it hits and has developed more speed so it is hitting harder and deforming worse. Quantifying Improvements Concentric ammo shoots better in any rifle and handguns. Ransom Rest testing of handguns shows improved performance with concentric ammunition of a similar degree to rifles.

Rimfires also benefit from having their ammo spun and Nielson Brothers Arms (Nielson-Brothers Arms. com, from crooked ammo by selecting or straightening cartridges to 0.003"

of run out or less. For 1000 yard events, the standard is 0.002" or less. manufactures a rimfire gauge and have calculated that for every 0.001" less run out, group sizes improve about 0.2" at 100 meters on average. I've machine rested AR-15s with similar results.

The most common cause of fliers is shooter error, followed by improper gun maintenance, changes in conditions (wind or lighting changes), and poor ammo. Eliminate fliers

At the bottom is a one-inch group with 0.002-.003" of run out. A fairly typical difference.

Spinning the remaining 40 rounds from the same box revealed a particularly crooked lot of ammo and I had to accept run out up to 0.004" but more consistent concentricity produced the group at bottom. Ideally, select or straighten ammo to 0.003" of run out or less, and 0.002" or less for 1000 yard events.

BETTER AMMUNITION CONTINUED

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at the bottom that keeps the bullet in better alignment with the case neck. Micrometer adjustment to vary seating depth is worthwhile. Other factors in the press will conspire to determine concentricity, such as the shell holder and the alignment of the ram to the die. Glen Zediker's Handloading For Competition and Sierra's web site includes tips for improving standard tools.

To help get your dies properly aligned with the shell holder and ram of your press, follow the die maker's instructions on how far down to screw sizing and bullet seating dies to the shell holder. With most dies I have worked with there will be a gap between the top of the shell holder and the bottom of the die. Before tightening down the lock ring to capture that setting, place a washer between the top of the shell holder and the bottom of the die. I like to use crush washers.

Apply upward pressure on the press handle to sandwich the washer between the top of the shell holder and the bottom of the die. Hold that pressure and screw the lock ring down securely. Remove the washer and you

are ready to load. The Marine Team uses a "half seat and spin" technique and I've found it improves concentricity by about 0.001" in multiple die and press configurations. Run the casing with the bullet set on top as straight as possible up into the die and approximately half seat the bullet.

Back the casing off just enough to remove all pressure from it and spin the whole cartridge about 180 degrees, then run it back up and gently seat the bullet completely. Don't slam the press handle as rough seating adds. Author prefers unit on right. Below center: Raise the ram up until the bottom of the die is firmly in touch with the crush washer and hold firm pressure with the press handle while simultaneously tightening the die lock washer. run out regardless of equipment used.

The theory of this technique is the stack up of manufacturing tolerances adds up to misalignment. If there is a "high spot" on one side, spinning the round half way around counter balances any imperfection the opposite direction. Try loading ten rounds by just

straight seating in one step and measure for average run out, then load a second set of ten rounds using the "half seat and spin" and measure them. I'll bet the second ten rounds have less run out.

Back in the M14 days there was a popular rumor that it made no sense to manage your rapid fire ammo concentricity because, "The violence of being fed up out of a magazine and into the chamber would just knock the bullets out of alignment anyway." Being the skeptic that I am, I tested the theory. I spun 10 rounds of .308 ammo and recorded the readings. Using a Team National Match M14, I charged them in a magazine and hand cycled them as violently as I could.

Measuring them all a second time showed not so much as a 0.001" difference in all ten rounds combined. I dug out another magazine and repeated the trial. Again, no difference! I spent the whole morning going through different gun and magazine combinations and by lunch time I still hadn't induced so much as a lousy 0.001" of additional

BETTER AMMUNITION CONTINUED

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Author prefers a hand trimmer to motorized units which seem to induce chatter. Above center: Mark index with a Sharpie on the high side of the cartridge. run out. Fast forward a couple of decades when I was beating up the USAR Shooting Team about concentricity management, I heard the same story applied to the AR-15. I repeated the experiment with the Mouse Gun and arrived at the exact same result. I challenged skeptics to repeat my test and nobody has ever come back quoting that tired myth since.

To be on the safe side, always run between 0.002-0.003" of neck tension on rapid fire ammunition. Sorting And Correcting Handloaders seem to just love sorting things. They weigh brass and bullets, measure bullet ogive, and spend countless hours sorting this and that. Most of it doesn't help accuracy in gas guns at all. The one exception to this rule is neck sorting. The wall thickness of cartridge casings is not uniform and there are tools to gauge the thickness of case necks.

I have tediously measured tens of thousands of them and have found neck thickness variations often to be 0.005-0.006" in the same case. Even using the best bullet seating die in the world, the thick side of the neck resists insertion of the bullet more, resulting in run out. I have marked the thick side of necks and then seated bullets finding that is a reli-

able indicator of the "high spot" run out occurs. Variation in neck thickness doesn't end with run out in the loaded round.

When such a cartridge is fired the thick side of the neck is going to hold onto the bullet with greater tenacity and the bullet is going to tip as it moves forward toward the rifling of the barrel. You have a bullet seated crooked going further off course as it moves out of the neck when fired. Don't confuse consistency of neck wall thickness with neck concentricity. The latter can also be measured and sorted and using casings with less neck run out will result in more concentric ammo that shoots better.

Brand new factory brass often has necks that are misaligned with the case body. Running crooked casings through dies only removes a small portion of the misalignment. The best way to straighten such casings is to fire form them in a match rifle chamber. The tens of thousands of pounds of pressure generated upon firing do a far better job than any sizing die. Keeping such cases segregated by the firearm they were shot in and then just neck sizing them results in enhanced accuracy.

To date, I've found Winchester .223 Remington cases to be the most consistently concentric with the case body. Some corrective measures for uneven case neck thickness. First, use a gauge to select the cases made with little variance to prevent the problem. This measurement takes along time so

save those cases for important long range matches. Furthermore, the percentage of casings born good is very limited. I haven't kept any official tallies but it is entirely possible to gauge ten casings to find a good one.

I like to see necks with no more than 0.001" of variance for long range matches and no more than 0.002" variance for 600 yards. I find consistent necks improves average concentricity by about 0.001". Brass born with good necks and bullets seated in competition dies with good technique often results in loaded ammo with almost zero run out. The second alternative to dealing with varying neck thickness is outside neck turning. Unfortunately, like gauging necks, it is very time consuming.

Hand tools do a good job and attempting to motorize things often reduces consistency. Done improperly, this can decrease accuracy. Outside neck turning is accomplished by running a hardened mandrel down the case neck to round it out and push out imperfections and high spots to be shaved off by a cutter. Properly done, about half of the outside of the neck is touched by the cutter and shaved down.

Any greater cut than that thins the neck excessively, resulting in bullet retention issues, split necks upon firing, gas leakage, and other problems. Note, I'm not saying to cut down the neck thickness by 50%, only that about

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half the neck will be touched by the cutter. As always follow the manufacturer's instructions and check out pages 92-104 of Zediker's Handloading For Competition. Because the thick sections of the neck have been shaved down, the neck has more uniform thickness, allows more consistent bullet seating and concentricity. When the round is fired the neck releases the bullet evenly on all sides and it tends to enter the rifling straighter. I've found neck turning reduces average group size by 21%.

Hand neck turning is slow, so I bought a motorized trimming tool originally designed to trim casings to a uniform length and modified by the manufacturer to perform outside neck uniforming. I have fooled with this thing for years and can't get it to work right and believe the motor is turning too fast and causing chatter, degrading performance. Even if I could get it to work properly it still isn't fast. Guns are finicky concerning neckturned brass. Some guns respond very well while others don't.

I suspect that the neck dimensions in individual chambers may be responsible for some of this, so test each gun with turned and non-turned brass to let the gun's actual performance tell you whether or not to bother. Another sorting technique is the mark index method. With no straightening tools available, we used to use this to deal with run out. After spinning a cartridge, the high side is marked so that it can be hand fed into the chamber indexed the same way, such as always feed the mark at 12 o'clock.

With the top open in bolt action and M14 rifles, this is easy to do even while in a sling and shooting coat. My experiments have

demonstrated this works as my groups tightened up while allowing use of all issue ammunition rather than a portion via the cull method. Years later, I began working with a machine rest and formally tested this. Even ammo with lots of run out shot well if uniformly indexed. AR-15 shooters find this technique more cumbersome due to the rifle's design, especially when strapped in position.

To make this work, some shooters place a spun and marked cartridge into a stripper clip to feed the round into the chamber through the ejection port. The index mark stayed at 12 o'clock where wanted and the rim of the cartridge even with the leading edge of the ejection port, resulting in more consistent positioning of the round in the chamber and equal pressures on the rim of the casing by the bolt face, ejector, and extractor.

My studies show that employing this technique will result in an average accuracy improvement of 13.8%. To understand how the mark index method works, consider how the base of the bullet contributes to performance. The bases of bullets seated with run out will not be perpendicular to the axis of the bore, causing tipping upon exit. If not indexed, one bullet may be pushed towards 6 o'clock while another at 12, 9, or 3 o'clock, or anywhere in between.

Mark indexing uniforms this by having any run out error in the same direction. Those bullets have no choice but to follow the rifling and will exit with the low side of their bases at the same position and blown a bit off course the same direction. There are two potential limitations to the Mark Index

Method. Upon firing, deformation of the front of the crooked bullets will still occur when they slam into the back of the barrel off center.

While the method evidently causes the bases of all bullets to index uniformly relative to their exit from the muzzle, it doesn't correct the amount of bullet tipping and 0.006" of run out will exhibit more error than 0.002" even if it's in the same direction. Mark index, when coupled with either straightening or culling rounds, can be extremely effective, especially with open top actions. The rifle machine rest I use shoots groups about half the size as High Masters normally deliver off the shoulder.

Even with that kind of performance I never fire around without using mark index. Mark index works far better than it "should". My studies show it reduces group size by 17.6% on average. While not quite as effective as selecting ammo born straight or using one of the straightening tools, it is faster than straightening.

Mirror Image The mirror image of cartridge concentricity is positioning cartridges uniformly in the chamber each time and always striving to get the bullet lined up perfectly with the center of the bore. A whole lot easier said than done! In my articles "AR-15 Chamber Selection" in the July-September 2014 issues, I discussed tight neck chambers. These certainly help align the case neck and bullet with the center axis of the bore, especially when using neck-turned brass.

HOWEVER, SELF-LOADING RIFLES NEED STANDARD DIMENSION CHAMBERS FOR

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reliable function. They can be fed with single rounds, however. One of my team shooters reported he saw less standard deviation in velocities when single feeding rounds into the chamber compared to just laying them on the magazine follower and allowing the bolt carrier to shove them in. He wondered if increases in accuracy might also result. I set up a study and found that average group size shrunk by 13.8% if the round was shoved into the chamber by hand.

I theorize this results in more uniform positioning of the cartridge in the chamber. My May 2014 article "AR-15 Upper Quick Fixes: Match Bolt Carriers" discussed match bolt carrier potentially offering improved accuracy by an average of 8.8%. I believe this is attributable to improved consistency in positioning of the round in the chamber. Until the problem of AR-15 bolt carrier tilt is corrected, the bolt face won't line up perpendicular to the bore and cartridges will always be somewhat out of alignment.

More uniform positioning occurs with fire forming after neck sizing. Shooters in the long range community have been employing these techniques for years to wring improved accuracy with their bolt guns. My tests show improvements with Stoner platforms if properly applied. When a gun is fired the casing swells under pressure of the expanding gas. The case walls are forced into tight contact with the chamber walls. When the pressure subsides the case shrinks back about 0.001".

The case never shrinks back to its original dimensions. When the shooter processes the case for its next use there is no need to resize the body because it already a nearly

perfectly fit. All that is needed is to size the neck back just enough to grip the bullet. I recommend a 0.247 outside neck bushing with military brass in the AR-15 for slow fire and a 0.246 bushing if reloading neck-turned brass. You also need to "bump" the shoulder back about 0.003".

This calls for a special die instead of a normal full length sizing die. I recommend Forster's Bushing Bump Neck Sizing Dies and Hornady's Headspace Gauge attached to a caliper to adjust the die properly. I performed a study on using fire forming followed by neck sizing and groups shrunk by about 16% compared to brand new brass. Fire formed brass is a reloading technique for long range single fire stages, not magazine-fed rapid fire events.

That said, I have fired tens of thousands of neck-sized rounds in magazine-fed rapid fire practice with never so much as a single function glitch attributed to the ammo. It results in ammo that better fits the chamber and aligns bullets near to the center axis of the bore. While working on this article I measured fired brass and compared it to full-length sized brass. The latter exhibited 0.003-0.007" more slop in the case body.

How many of you machinists would be satisfied in locating your chamber with that same degree of error from the center line of the bore? Using full-length sized brass for slow fire events is just the other side of the coin from a misaligned chamber. Don't mix brass fire formed in different guns because this can jam things up function wise. With afire-formed and neck-sized case body 0.003-0.007" fatter than full-length sized brass, chamber pressures may drop a bit.

If Far you are working right on the edge of primer retention, this can help. Wildcatters may fire form by shooting rounds into the dirt, but realize every round fired is fire formed. Simply pick cases up and used them in the same chamber. Clean chambers also improve consistency. We can hardly expect to center cartridges on the bore if the chamber is full of crud.

Likewise, if we are not cleaning and lubing our bolt carrier assemblies after every range session we can hardly expect them to position rounds uniformly each time with equal pressures on the case rims. I also like to see a little oil going on the rings during range sessions to keep the bolt carrier velocity uniform. Conclusion Getting rounds to line up with the bore starts with the gunsmith selecting a chamber with the right dimensions to match the customer's shooting needs and brass treatments.

When building new guns I always recommend using a match bolt carrier. Then the onus shifts to the shooter. Spin all ammo and either cull or straightening rounds with excessive run out. Consider the mark index for consistency. If hand loading, either gauge and selecting uniform necks or outside turn them. Consider fireformed and neck-sized brass for slow fire events. Use competition dies and half seat and spin when seating bullets. Always seat slow fire rounds up into the chamber by hand for uniform positioning.

Keep the gun clean and well oiled. Most important, pay attention to conditions and always maintain a religious application of marksmanship fundamentals! AG

HISTORY

Colt New Service

issue but you'll probably still see them on your bench.

BY ROBERT K. CAMPBELL APRIL 2016

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Not long ago I was in one of my favorite shops and the proprietor asked for a smidgen of knowledge since I was an “old gun guy.” I suppose I have earned the title. Old gun guys sometimes have good knowledge that isn’t strictly found in technical books. I have researched firearm history practically since I could read, beginning with books by C. B. Colby. Expedients used in war sometimes work well for general gunsmithing.

For example, getting wellworn M1 Garands shooting again can be helped with tricks first used on Guadalcanal. The same applies to the Colt New Service double-action revolver. The New Service is among the great, under-rated revolvers of all time in my opinion. Introduced in 1897 and offered in series production from 1898 to 1940, the Colt New Service served American and Allied servicemen, as well as the Royal Canadian Mounted Police and the New York State Patrol.

The most recognized Colt New Service revolver is the 1917 Model used during WWI. The Colt New Service is a rugged, reliable, effective revolver. It is also a piece of history. The holster is from WorldWarSupply.com from WWI. Some 360,000 New Service revolvers chambered

for 11 different cartridges were made during its long life. Chances are good one will come into your shop. While the operating principles of double action revolvers are similar, Colts differ a great deal from the Smith & Wessons.

Most of the problems with the New Service tend to be simple aging. The holes enlarge, parts wear, and springs take a set. Abuse is common. Most 1911s of the day were spot heat treated and I doubt these revolvers received much different. A new bolt to engage worn cylinder notches may be needed but first look at the mechanism. There are two screws holding the sideplate. I like to set them aside and keep them carefully separated.

When removing Colt sideplates, tapping the frame doesn’t work as well as with the Smith & Wesson, however, working the action a few times always loosens it. The Colt also differs in that compression of the trigger action feels heaviest at the onset and then becomes lighter, the opposite of Smith & Wessons. For many years, the word was Colt for targets and Smith & Wessons for longevity. Personally, I’ve found that either served well in both roles.

Some like to modify the V-type mainspring to achieve a lighter let off. This isn’t difficult but there is a right and wrong way. The right way is to field strip the pistol and clean the action thoroughly first. Often, simply cleaning the action solves New Service problems. Some of these revolvers are over a century old and the “new” ones are pushing eight decades, so simply scrubbing away powder ash and other material may be all that’s needed. The wrong way often breaks the spring.

This is when a screwdriver is inserted into the “V” and the two parts of the spring are pressed apart. I have seen this old trick used with other Colt revolvers. Sometimes it works but it can break the spring. The best means of achieving a cleaner break is to place one leg of the spring in the corner of a vise. With the spring carefully padded, begin with the spring leg clamped about 1/4" above the bend in the V-shaped spring. Then carefully pull the other leg outward.

Some of the work I have done focuses upon simply getting an old gun back up to normal operation. In one case, the hand was well worn and

COLT NEW SERVICE CONTINUED

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Above center: This 1917-vintage Colt needs a good cleaning. Powder residue is much in evidence. simply refused to index, although it did meet the ratchet properly. The owner simply wished to get the piece back into shooting condition for occasional plinking. I took the hand out, placed it on an anvil, and struck it hard with a hammer several times. The hand was peened and lengthened. It worked, though I informed the owner there was little guarantee of longevity and that anew hand was needed.

A few weeks later he told me it was the best twenty dollars he had spent with me and last I heard it continues to work. Another non-standard alternation is to modify the bolt stop when the cylinder locking notches have become worn. Anew bolt might Simply press up and out of the hammer hook. Below cen-

ter: The Colt is disassembled for the first step of thorough cleaning. It may be modified to an extent. not necessarily help.

While I have not tested these early revolvers for Rockwell hardness, it seems the heat treating is not modern. I've welded a ledge on the top of a bolt stop and then dressed it down as a fix. I've since found an easier means of achieving the same thing by mounting a pin under the bolt stop that kept it higher in the frame in relation to the cylinder bolt. If a shooter has one of the old Shooting Master revolvers or a revolver he enjoys firing, this work is worthwhile.

Anew hand or anew bolt stop when found would be even better. Cleaning these revolvers reveals this hoary action is greatly aided with good lubrication. A bit of careful polish on the rebound lever will also helps. To convince the bolt and cylinder to lockup more tightly, add metal at the front hump of

the cylinder bolt stop near the pivot hole. After a bit of experimentation the piece will lock up very tight. For real smoothness, look at the trigger and hammer engagement.

As mentioned, I'm not certain of the heat treating so polish lightly and don't redirect sear engagement. These old revolvers are pretty smooth as issued but the built up of powder ash and old oil should be removed. Chambering As with Colt Single Action Army and Smith & Wesson Triple Lock handguns, this is not the revolver to hot rod. Standard pressure .45 Colt loads are recommended. Black Hills Ammunition offers high quality Cowboy Action loads that are ideal for this revolver.

The Colt New Service was also chambered in .38-40 Winchester. Don't use +P loads in the M1917s chambered in .45 ACP. Standard 230 grain FMJ

COLT NEW SERVICE CONTINUED

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Bending slightly may help the action. Above center: V-shaped mainsprings are pretty tight at the closed juncture. A screwdriver could break it. Better to bend one of the long legs. is plenty hot enough and standard 230 grain lead loads are fine in .45 Auto Rim. Avoid rechambering the original British/Canadian .455 revolvers to .45 ACP by facing off the rear of the cylinder.

I realize this expedient kept old guns shooting but an original The .45 ACP at 230 grains/830 fps is stronger than the .455 at 265 grains/650 fps. Hornady offers first- 45 ACP cartridge. Far quality .455 Webley ammunition, which I've fired in a Webley (not a Colt yet) and find it accurate, clean burning, and pleasant to fire. When dealing with old steel, much of what we think we known is half known and half stipulated. Let's stick with what we know for safety's sake.

Also, note that a few very early 1917 Colt revolvers did not feature a chambering step for .45 ACP loads. The revolvers had to be fired with half moon clips holding three cartridges. Later revolvers did feature the chambering step. While the ejector star won't eject rimless .45 ACP cartridges, the Colt will fire them. The Colt New Service is an interesting and effective revolver. I think that gunsmiths are doing a service to history in keeping them running and useful. AG

MEASUREMENT & INSPECTION

Headspace And Gauges

An understanding of headspace and gauges is critical to gunsmithing.

BY ROBERT K. CAMPBELL APRIL 2016

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I recently had an ugly experience with excessive headspace when testing a handgun. Not only was the individual handgun unsafe, it seems the design itself was beyond any of the usual fixes. Understanding headspace and its consequences is critical. In this case, the maker did not understand headspace or somewhere in the manufacturing process something went wrong. It isn't that uncommon.

For example, Lee-Enfield rifles fought in two world wars and are regarded as the most reliable military bolt actions, yet the action was loose enough that handloaders often complain of brass stretching and short case life. This intentional looseness was deemed an acceptable trade off when the rifle was designed and built but isn't ideal for the enthusiastic handloader. Headspace on these rifles may be adjusted by use of a different bolt but that is a specific fix and we're looking at the broad picture.

Headspace is the distance from the breechface to a finite point in This is the shipping and storage case. the chamber. Different cartridges demand different points of measurement and need to be understood. Some cartridges are measured from breech face to cartridge case mouth, as is the case of the .45 ACP. Cartridges with rims, such as .22LR and .38 Special are measured by the

thickness of the cartridge rim itself. Bottleneck rifle cartridges are measured by measuring the breechface to the cartridge shoulder.

I've found headspace is important to accuracy and reliability as well as safety. Too much slop and give in the measurements results in uncontrolled pressure. Headspace is an important determiner of quality manufacture, a gauge of a firearm's safety, and often an indicator of erratic or eccentric wear. Examine headspace when investigating safety issues, such as a firearm blowing primers.

Other potential problems can be found while checking headspace, such as close examination of the bore and checking for bore restrictions, and chamber condition. A properly-headspaced firearm will contain chamber pressure given quality brass and loads that are in specification though higher pressure cartridges can potentially cause a more serious situation if headspace is out of specification. An essential point of the gunsmith's kit is a headspace gauge for each individual cartridge likely to be encounter.

These gauges are high quality, hardened steel in the proper dimensions. They are much higher form of chamber check. Simply dropping cartridges into the chamber or cylinder as a check for fit is a good

test to ensure reliable function. This doesn't necessarily mean that headspace is proper but the cartridges will chamber. As an aside, I haven't found out of spec cartridges among the Big Three, Hornady, and Black Hills Ammunition but have found plenty from manufacturers in the Pacific Rim and south of the border.

As such, they are not service grade loads! It's essential to use a proper gauge. I've seen so-called tests using tape-wrapped cartridge cases, brass rods pressed through the barrel to pull a cartridge forward, and cartridges marked with a Sharpie and chambered to judge by the smudges. These are worthless. Headspace gauges typically come in two dimensions labeled Go and No Go. The Go gauge indicates if the chamber is deep enough and in revolvers measures the length of the chamber.

A chamber that is too short or out of specification may cause spiking pressure. The cartridge case has good expansion properties and may not expand properly in a too short chamber. Test if the chamber is too deep with a No Go gauge that should not fit the chamber. These gauges may be used after an obvious problem such as a firing pin piercing the primer, a common sign of a too short chamber. Excess headspace may exhibit an unsupported cartridge case head, possibly

HEADSPACE AND GAUGES CONTINUED

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leading to failure or erratic ignition. Cartridges in a too-long chamber may be pushed forward by the firing pin strike rather than the primer being properly ignited. The chamber may hold the case but the powder ignition will not be when intended, resulting in poor accuracy. A primer may back out and gas may flow out even if the load isn't off specification. Proper extraction may also be adversely affected by a too long chamber.

When dealing with gauges of such a precision nature never force their Clymer gauges are well polished. fit. Do not hammer or tap

them into the chamber. The chamber should be perfectly cleaned and degreased before. First, insert the Go gauge and close the action. With revolver, check each individual chamber. If there is any type of binding hesitation, stopping, excess effort, or the action won't close, the chamber is short and needs to be corrected. Next, insert the No Go gauge.

The action should not be able to close. If so, headspace is excessive and the chamber is too deep. Spanish copies of the Smith & Wesson Military and Police revolver. The re-

volvers in .32-20 WCF are bored to the point that the cartridge case blows out straight from its bottle-necked profile. Some were evidently intended to accept both the 8mm Lebel and .32-20, however, even those marked .32-20 often give a As an example of improper chamber reaming, I have tested a number of the common problem.

Others in .38 Special accept a No Go gauge in .38 Special. Sometimes these chambers are marked .38 Long Colt but will accept .38 Special and also

HEADSPACE AND GAUGES CONTINUED

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Above center: The Manson gauge has given excellent service. Note the good finish. the longer .357 Magnum. This is a dangerous situation found in some old Brothers Hermanos and other makes which were none too strong when new. A catastrophic failure would be the result of firing a Magnum in these chambers. In another example, an eccentric run of .44 Special Colt Single Action Army revolvers was found to accept the .44 Magnum cartridge.

However, it appeared that while the cartridge would chamber and fire, the chamber was tight enough that Below center: Flattened primers mean excess pressure. Headspace may be the problem. I believe the crimp would not have opened and likely would result in essentially a hand grenade at arm's length. From one of the poorest makers to our finest, I've sometimes found the cartridge chamber isn't always cut properly. It is a more complicated matter to properly check headspace in self loaders.

The chamber must be clean and grease free, as well as the breech face. Remove the extractor as some self loaders will headspace by the extractor instead of correctly headspacing on the cartridge case mouth. Insert the Go gauge and then check for proper lockup. With the No Go gauge the slide should not close over the gauge. Measuring headspace in a roller-locked rifle, such as the Century C91 or PTR 91, is a different proposition. Century International Arms recombes be used.

The gap between the bolt head and bolt header carrier should be between 0.005 and 0.19. Using standard headspace gauges we close the bolt on a chambered gauge and stop closing the bolt when resistance is felt. If the bolt closes, the length of the datum line to the breech face is greater than the length of the gauge. However, there is some argument that headspace isn't a function of the locking lugs staying in place.

The position of the roller cams or locking rollers and the inclined position of the locking piece are what will determine headspace in this design. The headspace on CETME rifles is less than the shorter gauge. Closing the bolt on a No Go gauge widened the gap, indicating standard gauges are useful with this rifle. This is due to occasional issues with excess headspace in these actions. As an alternative check, clear the rifle, lock the bolt rearward, and press the trigger to release the hammer. Invert the rifle.

With the magazine well facing up, use a 0.5mm feeler gauge and slide it into the gap between the rear of the bolt mends feeler gaug head and the bolt carrier's front. This is the maximum proper gap and it should be a tight fit. The 0.25mm feeler gauge should fit between the bolt head and carrier. If the gap is tighter then this, the rifle may exhibit problems with extraction and ejection. AG

MAINTENANCE & REPAIR

Reader Forum

BY AMERICAN GUNSMITH EDITORS APRIL 2016

ORIGINAL PP. 23-24

Remington Model 12 I have a Remington Model 12 chambered in .22 Remington Special (.22 Winchester Rimfire) in my shop for repair. I need anew cartridge retainer as the retainer for the .22 LR does not work. Lacking a replacement part, where can I find a drawing with dimensions so I can make one? I have Lee Roy Wisner's Handbook of Hardto-Find Gun Parts Drawings but this part isn't in there. Allen J.

Wengerd Since the gun went out of production in 1926, Remington would be the only source we know of for a copy of a working drawing. The Jack First Catalog, Volume II #10 from Jack First Gunshop (JackFirstGun.com) lists a cartridge retainer for the rifle. Workshop Aids On A Budget I enjoyed "Workshop Aids On A Budget" in the January 2016 issue. Like you, I have always made do with what's at hand to keep costs down. I am still using the wooden adjustable rifle cradle I made over 30 years ago.

It is not as fancy and as adjustable as the one you described but it still fills my needs. The thing that took my interest most was the piece of angle iron screwed to the bottom of the tool you produced. For me, it was another one of those "Why didn't I think of that?" things. The base of my rifle cradle is along piece of 1x8 pine that is made to sit on a flat bench.

I screwed a short piece of thin angle iron onto the bottom and now I can rotate my cradle to position the gun I am working on in nearly any direction needed by rotating the vise and locking it down. It works like a champ, except now I can't sit my cradle on the work bench anymore when I need the gun held lower. To remedy, I cut two pieces from 1x2 pine to the width of my

bottom plate and screwed each near the end of the plate, clearing the angle iron piece by several inches.

My cradle can now sit firm on my work bench again without raising the gun any more than the height of the 1x2. Thank you for your shop hints. Fletcher M. Pool Author Dick Maheu responds. Thanks for your comments and glad to hear your cradle is working with the modification. When I first started it was like pulling teeth to get old timer gunsmiths to give up any "secrets" or pass along hard-won tips. American Gunsmith publishes such info meant to help all, novice or professional.

Al's Gun Repair Whitehall, WI Damascus Barrels The Reader Forum of the January 2016 issue had comments on shooting old shotguns with Damascus steel barrels. I have several that I use regularly to hunt small game with using nothing but blackpowder, fiber and cardboard wads, and one ounce of 7 1/2 shot. These guns have been carefully inspected and deemed safe though not recommended to shoot for the very reasons mentioned in the response to Hugh about Break Open Actions.

I have been giving careful consideration to the use of a sub-caliber/ gauge chamber insert called Chamber Mates by Seminole Gunworks (chambermates.com, in at least one of these guns, allowing the use of modern/smokeless .410 or 20 gauge shotshells. I have a pair of both sizes to fit my 12 gauge that fits all of my blackpowder doubles. I haven't used them yet. Do you have an opinion on the safety of these?

Tom Lehmann Manhattan, Kansas We have never checked out the Chamber Mates inserts but the name alone concerns us as it suggests they do not extend the full length of the questionable barrel. Therefore, they would insufficiently contribute to preventing a structural disaster.

Inserts we're quite familiar with are full length and made by Briley Manufacturing (briley.com, They have long been proven for preventing the unwinding of Damascus barrels when converting from black to smokeless powder loads in those cases where the hunter is not concerned about a reduction in bore/gauge or holds no similar concern should a barrel be bulged or blown, useless due to an accidental blockage.

Ordway, CO 1903A3 Barrel Threading I am looking for info on how to cut the square Acme threads for the 1903A3 barrel. David Cunningham Dave's Gunsmithing Service, LLC The Complete Illustrated Guide to Precision Rifle Barrel Fitting by John Hinnant is an excellent book on barrel fitting and includes a brief but thorough section on turning these unusual threads. The cutter used is a parting tool. At its business end it is thicker and more trapezoidal when compared to a regular parting tool.

If you have machine tool experience and know the threads per inch required, you should have no great difficulty cutting the threads. Be certain, of course, that the internal threads of the receiver have been cut to accept the threads being cut into the barrel. On the other hand, if you lack machine tool skills begin acquiring them immediately. Direct your browser to "Lathe Operations." A lengthy list of links will result. Avoid involvement with the multi-function machine tools.

In our opinion, these lack the close tolerance capabilities required when working on firearms. Lathes that do, while quite expensive, are the wiser choice in the long run. Lathes are exactly like any other hand or machine tool: The higher the quality of the tool the greater the opportunity to produce an exceptional

READER FORUM CONTINUED

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result. Naturally, the skills of the tool user contribute heavily to the degree of exceptionalism. Other links to avoid at least for your purposes are those dedicated to mini lathes. While they can be very useful in becoming familiarized with lathe operations and making small replacement parts such as screws and firing pins, they simply aren't big enough for rifle work. Ideally, the best route to follow is via a local machine shop willing to provide some hands-on tutoring.

Lacking one, investigate local colleges and/or vocational schools offering courses in machine tool operations. Correspondence schools are another possibility but to make the best of the courses offered you should have a mini lathe on hand to attempt and master the instruction provided. Mauser 98 Firing Pin I have run into a problem with the firing pin protrusion on a Kar 98k bolt. I have been working on one with a protrusion of 0.050" which shows shallow primer hits.

According to Mauser Bolt Action Shop Manual M91 Through M98 by Jerry Kuhnhausen, the correct protrusion should be 0.055" to 0.065". I tried using different firing pins, including ones from a BRNO, several Model 08s, and a new one from SARCO. I even tried several different cocking pieces and still end up at 0.050". Yes, the inside of the bolt is clean and the firing pin drops through substantially without the cocking piece and the headspace is minimum.

I don't like the idea of milling either of the cocking piece to bolt sleeve surfaces as that can alter the safety cam timing and lock. In the days of black powder you took a big hammer and beat on the firing pin to extend it but that is not acceptable to me in this case. Any suggestions on "rolling" it or another method to elongate the pin about 0.010"? I don't like the idea of welding if it can be avoided. Use a true, flat hard surface and a light chasing or flat head of ball peen hammer.

Roll the firing pin back and forth on the flat to expose 360 degrees of the pin surface while tapping it repeatedly with the hammer. Work from behind the tip of the pin to its front. It's called "peening" and it works. Browning A5 What is the tap size for the carrier hole on the Browning A5 receiver? Robert Loughlin You might find the original A5 screw size in The Encyclopedia of Modern Firearms by Brownells. However, this shotgun, now discontinued, has been made offshore.

It would be best to contact Browning/Winchester customer service with the serial number of your A5 to confirm screw and tap size. Ithaca Model 37 I have a customer's Ithaca Model 37 that will not extract a fired shotshell. The shotgun cycles perfectly with unfired ammunition but will not extract a fired hull. I polished the chamber but that did not help. I opened up the throat a little and that seemed to help but when I polished the chamber again, I was back to square one! Any suggestions would be appreciated.

Gary Hutchins Make a chamber cast with Cerrosafe and measure it against SAAMI specifications. You may find it over length and the hulls are expanding to fill the space. Check the headspace with Go and No Go gauges. Check the extractors and extractor springs. Replace if worn, weak, or damaged. Ken Angst H&R 604 Revolver I am looking for a disassembly instructions for the H&R 604 revolver. Ron Vaillancourt Page 176 of The Gun Digest Book of Revolvers Assembly/Disassembly has this.

H&R, the company, has been passed between owner-ships frequently. Despite all the moving about, there haven't been major changes made in the basic design. As a result, while the handgun described in the Gun Digest book may not actually be a Model 604, the instructions given should not lead you astray. AG

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