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QUICK DETACH SLING MOUNTS IN HOLLOW SYNTHETIC STOCKS

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ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 143

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FROM THE ARCHIVE

Concealed Carry Report

BY AMERICAN GUNSMITH EDITORS NOVEMBER 2015

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On July 13, 2015 John R. Lott Jr. and Rebekah C. Riley of the Crime Prevention Research Center and John E. Whitley of the Institute for Defense Analyses published *Concealed Carry Permit Holders Across the United States*, a paper reporting on the impact of the increased number of issued carry permits. Over the years, more states have adopted laws to allow individuals to obtain concealed carry permits. Illinois was the last state to do so, with the first permits issued in March 2014. Even Washington, D.

C. started issuing permits earlier this year. Today, permitted concealed handguns are allowed in every jurisdiction in the United States. Initially the increase in permits was slow, growing from roughly 2.7 million permit holders in 1999 to 4.6 million in 2007. But the number of concealed handgun permits literally exploded during the Obama presidency. By December 2011 the federal Government Accountability Office estimated that there were at least 8 million concealed handgun permits.

By June 2014 it was 11.1 million; in 2015, 12.8 million. In other words, during the eight years from 1999 to 2007, the number of permits increased by about 240,000 per year. During the next four years the number of permits surged by 850,000 per year. Then from the end of 2011 to 2013 the yearly increase rose by 1,550,000. And during the last year the increase has continued to accelerate to 1,700,000.

Since President Obama's election the number of concealed handgun permits has soared, growing from 4.6 million in 2007 to over 12.8 million this year. What ef-

fects occurred during this increase? Among the reported findings:

- The number of concealed handgun permits is increasing at an ever-increasing rate. Over the past year 1.7 million additional new permits have been issued—a 15.4% increase in just one single year.

This is the largest ever single-year increase in the number of concealed handgun permits. 5.2% of the total adult population has a permit. Five states now have more than 10% of their adult population with concealed handgun permits. In ten states a permit is no longer required to carry at all. Since 2007, permits for women increased by 270% and 156% for men. Some evidence suggests that permit holding by minorities is increasing more than twice as fast as for whites.

Between 2007 and 2014, murder rates have fallen from 5.6 to 4.2 (preliminary estimates) per 100,000. This represents a 25% drop in the murder rate at the same time that the percentage of the adult population with permits soared by 156%. Overall violent crime also fell by 25 percent over that period of time. States with the largest increase in permits have seen the largest relative drops in murder rates. Concealed handgun permit holders are law abiding.

In Florida and Texas, permit holders are convicted of crimes at 1/6 the rate of police officers. A full copy can be downloaded for free at ssrn.com/abstract=2629704.
Fast X, • • • • • John M. Buol Jr.
AmericanGunsmith.info

FROM THE ARCHIVE

Lauer Custom Dura Blue

The folks behind the Bloomberg Gun bring a bluing revolution. If your primary business is rebluing, you may be tempted to scrap your tanks.

BY CHICK BLOOD NOVEMBER 2015

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Never heard of The Bloomberg Gun? Surely you jest. If not, then you're likely among the multitude who prefer not to remember Michael Bloomberg, the multi-millionaire, TV channel owner, and a former mayor of New York City. For no reason not attributed to pure party politics he was elected thrice. In retrospect, many feel this was twice too often. He is no longer mayor, having recently been replaced by an individual bent on a crusade to render the 35,000+ member NYPD ineffective. Politics strikes again.

Of course Michael B. had crusades, too. His first was anti-smoking. He was almost demonic in his determination to eliminate smoking regardless of the major tax loss to the city forbidding lighting up would cause. For example, indoors everywhere became a no smoking zone. Any puffing had to take place outdoors and a minimum of 15 feet away from the entrance to any building. So it was ordered, so it was done.

Cigarette butts, well-chewed cigar stubs, and dead ashes from pipes piled up at the specified distance all over town. This eyesore was offensive to shop owners and building occupants as well as passers-by. Any lasting complaints were resolved by already over-worked maintenance people but the rules remained along with the tax loss. By the time the first crusade concluded,

smoking outdoors had been banned. The ban even included open spaces like Central Park! Mike's second crusade soon followed.

Based on no scientific fact, he announced consuming more than eight ounces of soda or similar nonalcoholic refreshments at a sitting was dangerous to the health of all living persons within or visiting the Big Apple. See here, Mr. Mayor-nanny, it simply isn't politic to mess with any major contributors to the city council. That fact and a noisy, media-supported public protest signaled a quick end to his second crusade.

Chalking the defeat up to a "vast right wing conspiracy," Hizzoner set off almost immediately on his third crusade, even more vindictive than crusade number two, because it was about guns. Bloomberg deeply believed guns were evil. All guns. The most evil were guns of a color other than blue, blue-black, dull grey-green, dull grey, or chrome as those were how the guns being carried by the personal bodyguards and state troopers charged with protecting New York City's Chief Executive looked.

No mistake about it, those looked like guns. The third crusade might have ended there but Mayor Mike had seen pictures of red, bright green, yellow, pink, orange, and even purple handguns. His exquisite logic leaped into action. A toy gun could be painted to look like a real gun and a real gun could be painted to look like a toy.

These conditions might cause a first-on-the-scene investigating law enforcement officer to bring his or her gun into immediate, possibly fatal, action or fail to do so and be seriously wounded or killed. To The Mayor, the solution to this ever-arising concern during his administration was to outlaw all products used to paint guns. Overlooked or deliberately ignored were any of the portable paint products sold in hardware, home improvement, hobby, and craft stores that could be used to paint a firearm.

Most certainly it would include any coating, aerosol or otherwise, primarily intended for servicing guns. While the resulting prohibition allowed the continued availability of many other aerosol paint products at the mentioned sources, it ended up to being very specific. It flat outlawed one product well known in the gunsmithing/customizing business for strength, surface integrity, and prevention of rust: Dura Coat. The final decision was that Dura Coat is intended for guns, so it was banned.

This was taken personally in Chippewa Falls, Wisconsin, the home of Lauer Custom Weaponry (lauerweaponry.com), and Dura Coat headquarters. In particular, Bloomberg had teed off Steve Lauer,

LAUER CUSTOM DURA BLUE CONTINUED

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Not shown here is Dura Fil for treating scratches and deeper pits. Much more appear in the Lauer Custom Weaponry catalog including Peel 'N Spray Templates, Dura Hunter camo patterns, Military/LE patterns, finishing equipment and supplies, and, of course, the Bloomberg Collection Camo Pak to make your own Bloomberg Gun to display in your shop. The founder and half of the brains behind the company. The other (and far better looking) half belonged to his wife, Debbie.

Lauer Custom launched a lawsuit against the prohibition of their product but didn't stop there. Lauer carried the company's highly successful combo of Dura Coat and DIY camouflage templates to unmatched heights by converting a standard AR-15 into the Bloomberg Gun, intended as a gift for the

Mayor. As far as I know, he rejected the offering while undergoing a snit. As a result, more unwelcome honors were subsequently heaped upon Hizzoner by LCW and Dura-Coat.

The Lauers have combined several of their coatings into the Bloomberg Collection. Each unique color in it represents a borough of New York City. There is Manhattan Red, Bronx Rose, Brooklyn Blue, Queens Green, and Staten Island Orange. Take note, those specific tones are only available as just described here. They cannot be imitated. The monotone photo of the Bloomberg Gun accompanying this article does it little justice.

When it made its introductory appearance at SHOT Show and the NRA Annual Meetings and Exhibits it drew gleeful crowds to the

LCW booth. The overall background is red brick with grey mortar joints. Each of the five boroughs is spelled out in its dedicated color. What can't be seen in The cap is placed on the valve and depressed to release the hardening compound to mix with the Dura Blue inside the can. the photo are the imitation bullet holes and graffiti in the brick pattern.

Among the most memorable of the graffiti is "For a good time call 212-xxx-xxxx", the x's here substituting for what was the actual direct number to the phone on Bloomberg's desk. So the best laid plan to commit Dura Coat to dinosaur status back fired big time on city hall. What it accomplished instead was a business

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The blue goes deeper than it is possible to show clearly here but the reflection on the surface comes from the polished metal beneath it. On the right, two barrels in need join it for comparison. boom at Lauer Custom Weaponry that is still booming. In my opinion and of others having seen the results, an even louder boom awaits the success of Dura Blue. I first saw it at 2015 SHOT. For a moment I thought I was looking at decade-old Colt revolver still proudly wearing its original finish.

The senior citizens among our readership may recall the bluing on older Colts appeared to have “no bottom” as the finish appeared infinite, often called “fire blue.” It required a highly polished substrate, high temperatures and highly dangerous chemicals to achieve. Most of those compounds have been outlawed. One of them was known to generate cyanide gas, the same used in a gas chamber!

A close match for the old Colt blue could be earned today by using a nitre bluing process, however, this requires temperatures high enough to negatively affect receiver and bar-

rel temper while completely neutering springs. Even with half a brain, Steve Lauer knew all this and more. There had to be another way of getting that old Colt blue look. Could it be done with Dura Coat? He set to work. A few years after he did I got my first look at Dura Blue. The precise compounding of the product is patented.

Suffice it to say it contains no chemicals capable of generating cyanide gas but should be applied under ventilated conditions. In that one respect, Dura Blue is no different from any other aerosol-applied coating. Any other comparison does not apply. Using Dura Blue I’ll assume you have a revolver on hand in dire need of refinishing. For this article, I did not.

What I did have were two barrels in for small dent removal and an 870 barrel missing a front sight bead that was dented so badly the owner was aiming it toward the town dump. My hydraulic dent remover saved the tube. After raising a really awful dent I continued with a Dura Blue resurrection. This began by removing all of the remaining original blue

along with a few rusty areas. You should do the same. If the work piece is a revolver, strip it down to the frame with barrel attached and after removing the cylinder.

I used Birchwood Casey Blue & Rust Remover and a Scotch-Brite pad to attack the barrel which was effective. Polish the components. In my case there was only one. If they are to be included in a barrel deal, add the exposed trigger and sides of the hammer to the project. Remember, the smoother and brighter the polishing the better looking the final bluing job will turn out. Before completing the polishing, apply Dura Fil Surface Filler to cover any deep scratches or pits.

Flush and wipe away all residue from the polishing and any filling. Mineral spirits, 1-K grade kerosene, and denatured alcohol from the hardware store all work for this, though I prefer the latter because the alcohol evaporates quickly and leaves little to no remains behind. Go over all concerned parts with Lauer Tru Strip Gun Cleaner-Degreaser. It does just as good a job of degreasing

LAUER CUSTOM DURA BLUE CONTINUED

ORIGINAL PAGE 6

and cleaning as trichloroethylene always did, which has been proclaimed verboten by the Feds and is off the shelves. Surface prep is vital to all bluing jobs. Once the surface is degreased, avoid contacting it with your hands. Have a box of surgical gloves to accomplish this “no hands” policy. There may be some folks who’d suggest a thumb print showing up on a completed bluing job gives it character but I have yet to meet one of those people and probably never will.

In this process, sanding or sand blasting are optional. Both will prep the substrate for enhanced adherence of Dura Blue, where-in metal surfaces are not subjected to a very hot bath to keep the micropores open to a sizeable dose of bluing salts. If your decision is to hand sand, use 400 grit paper or 000 synthetic steel wool. If sand blasting is the choice, use 120 grit aluminum oxide.

In in either case, mask any openings in the receiver to avoid intrusion of and possible damage to small internal parts by abrasive particles. Painter’s tape, in reality just better quality masking tape wearing a blue dress, will serve in the process of avoiding such damage. Now there’s another choice to be made. Dura Blue is available in two configurations. In one, the product arrives in a bottle.

The catalyst (hard-ener) arrives at the same time but not inside the bottle. Instead, there’s a mixing ball inside.

You shake the bottle until you hear the mixing ball rattle, then shake it for three more minutes. Three minutes, no less.

Combine four tablespoons from the bottle with one teaspoon of the hardener. Shake for three more minutes. You have a 12:1 mixture and six to eight hours of product life to apply it. Before application, block the barrel and breech and check the masking. Use an airbrush in thin, even passes. Apply from three to ten coats allowing ten minutes between each.

The last coat should be heavier and more glossy as compared to earlier coatings. All coats may not appear even at first but will level out as each one sets up. Clean your airbrush equipment with Dura Coat Reducer and hang the parts up to dry overnight. After the final coating and overnight hang up the parts can be safely handled. With mild caution, any disassembled gun can be reassembled.

After three or four weeks cure time the finish won’t scratch or chip, will be resistant to all solvents and cleaners, and will never rust. In the other configuration the product arrives in an aerosol can more than a little different from those you’re accustomed to seeing. A mixing ball is inside the can. After the ball audibly makes its presence known, shake the can three minutes. No less. The catalyst is inside the can, too. The translucent cover on the can secures ared plastic cap.

Remove the cap and invert the can. See the valve in the base? Place the red cap over the valve. Press down. You have just released the catalyst to engage and mix with the Dura Blue. Shake the can three more minutes to complete the marriage. No less. The substrate has to be prepped as

per the previous instructions. Application using the aerosol can is to be performed as it was described for an airbrush but the can provides 12- 48 hours worth of product life and clean up is simpler.

Merely invert the can and press the spray nozzle for a couple of quick squirts. The third squirt will very likely come out clear. You’ll notice the can comes with two spray nozzles, black and white. Either can be used for the Dura Blue application and can provide a vertical or horizontal spray pattern by turning clockwise on the valve at the top of the can with needle nose pliers. It is also possible for these nozzles to clog. To exchange one for the other, pull straight upward on the clogged nozzle to remove it.

Introduce its replacement to the valve and, turning it gently back and forth, work it down to seat at the upper valve’s base. If you have ever tried to replace a clogged spray nozzle on the average aerosol can of paint you’ve already learned the bitter lesson of misfiring a random dot pattern onto a nearby wall, whatever you’re working with, and your just-laundered khaki pants. Since you’ve now been reminded ahead of time, such accidents are less likely to occur with an aerosol can of Dura Blue.

They can be totally avoided with the inverted nozzle-clearing squirts previously described. Consider that the wisest course following the application of any pigmented material from a pressurized container. Welcome to the revolution! AG

RIFLES

The Basics Of Reaming Rifle Barrels

Details on barrel reaming with modern machines and tools.

BY CHARLES J. MOORE NOVEMBER 2015

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During the pre-Industrial era, the job of reaming a gun barrel was a time consuming process. There were no reamers as have today. The gunsmiths of the period had only a few different types of scrapers at their disposal. Normally, two different kinds of scrapers were used to bring the bore of a barrel to the required internal dimensions and surface finish. The scrapers were run through the bore several times while being spun, usually by means of a hand wheel.

Each pass of the scrapers through the bore brought the barrel blank an incremental step closer to being completed. While the process was rather labor intensive, good finished bore quality could be achieved simply because so little iron was being removed on each pass through the bore.

Every so often, the gunsmith The angle should be 5° measured from a line drawn perpendicular to the tangent. would pass a lead slug through the bore, and then measure the swaged diameter of the slug to determine when the barrel's bore had reached the required dimension. The first scraper that was typically applied to the bore was designed to remove scale from the interior of the barrel blank.

Because early gun barrels were hot forged over a mandrel and then forge welded at the seams, all while exposed to the oxygen-

rich atmosphere, heavy scale was formed inside the bore during the process. The same type of scale can be readily seen and felt on the exterior of a piece of hot rolled steel today. Scale contains carbides and other types of very hard compounds. These hard substances are quite difficult to cut and tend to dull cutting tools rather quickly.

The scrapers produced to remove the scale were very simple in design and not intended to produce a smooth, uniform finished bore. The form of scraper commonly used for this application was an iron bar that had been hammered square and then twisted until the measurement across the helical corners was just over the size of the bore when it came off of the mandrel. The corners of the twisted scraper would break the scale free of the bore's surface through shear abrasive action and brute force.

Once the scale was removed and the raw iron exposed, the finish scraper could be brought into play. There were two types of finishing scrapers employed to bring the bore to finished dimensions. One type used around head made of hardwood, such as maple or ash. A mortise was cut in the head into which a small block of hardened iron could be placed. The upper corners of the block would be stoned to ensure they were sharp.

Then paper shims would be placed in the bottom of the mortise until the corners were high enough to scrape the bore when the head was run through the barrel. Many passes of the scraper were required to remove a sufficient amount of iron to produce a smooth bore. Paper shims were added under the scraper bit each time the bore had been scraped large enough to make it a loose fit. In this fashion, the bore would eventually be brought to finished dimensions.

Since this was a scraping tool rather than a cutting tool, the scraper could be rotated in either direction (clockwise or counter-clockwise) without affecting the action of the tool. Alternating the direction of the tool's spin would also bring both corners into play, which would double the number of passes that could be taken before the scraper needed to be sharpened again. The second type of scraper commonly used for finishing the bore was a hardened, square iron bit that was slightly under the size of the bore.

To use this tool, a half-round sliver of wood was placed under one side of the tool to push the corners of the opposite side into contact with the bore. As material was removed from the bore and the fit of the tool became loose,

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That little white curl on the top flute is a shaving off the back of my fingernail. If a reamer isn't sharp enough to shave a fingernail, it's not sharp enough to ream a rifle barrel. paper shims were added between the bit and the wood filler to take up the slack. Once again, this type of scraper could be rotated in either direction and it took repeated passes of the tool through the bore to bring the internal dimensions to specifications.

This type of scraper was still being used for finishing the bores of gun barrels after the Industrial Revolution but the need for more efficient tools was clearly evident. Reamer Geometry As society became increasingly more mechanized and mass production was born, a quick, easy way to produce holes with good surface finishes and tight tolerances in all types of steel components (not just gun barrels) was needed. A tool that could accurately cut, rather than scrape, steel was ideal.

Reamer design improved to meet this need. Contemporary machine reamers have a chamfer angle on the nose of the tool. Most, if not all of the cutting action takes place at the chamfer while the remaining length of the cutting flutes provide support to the tool as well as scraping and burnishing the hole. Some reamers have a starting angle that will also cut material away from

the radius of the hole as the tool is advanced. The starting angle of these reamers is usually 1° to 5° .

Since these tools are designed to cut steel rather than simply scraping the surface, they also have a rake angle on the cutting edge, usually 5° . The rake angle produces less pressure during the cut and provides a smoother surface finish. The reamers designed for reaming gun barrels usually have a rather long tapered section that leads to a shorter parallel-sided section. All of the cutting takes place on the tapered portion of the reamer flutes.

In addition to the rake angle at the face of the cutting edge, the flutes are also equipped with a relief angle behind the cutting edge. The relief angle ensures that the trailing edge of the flute cannot come into contact with the bore. Contact of this sort would prevent the cutting edge from biting into the steel and removing material from the barrel blank. If an unrelieved margin is left on the actual cutting portion of the reamer flutes, this margin must be very thin.

Anything more than the thinnest imaginable margin on the cutting edges will prevent them from cutting. As noted above, the taper of the flutes can be set at any angle between about 1° and 5° . The actual angle used on an individual reamer will be determined by the length of the cutting flutes

and the amount of material (depth of cut) that the reamer will be required to remove from the bore. Behind the tapered, cutting section of the reamers used for gun barrels lies a short parallel section.

This section of the reamer is not designed to cut steel at all. The purpose of this section is to scrape and burnish the finished bore to remove any slight imperfections left behind by the cutting section. A secondary function of the parallel section of a gun barrel reamer is to provide additional support and stability to the back of the tool. This support discourages chatter during the cut and provides for a smoother surface finish.

Because this section is for stability rather than cutting ability, the margin is left considerable wider on this section of the flutes. A margin measuring several thousandths of an inch wide is common here. Not only does the additional surface area provide more stability, it also reduces the rate of erosion on this surface and this tends to extend the life of the reamer.

Once the tops of the parallel flute sections are worn below the lower tolerance limit for hole size, the reamer can no longer be used to ream barrels of the caliber it was designed for. At the trailing edge of the reamer flutes is a chamfer. Unlike machine reamers, which have chamfers that are designed to cut, the sole purpose of

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The residual oil left in the barrel after shutting off the pump motor tends to flush the chips out and make a bit of a mess. The cutting oil pump must be turned off before the reamer exits the bore to avoid making a mess. This is the section of the bore that was reamed after the cutting oil flow stopped. The rest of the bore is much better.

This section will be cut off later to form the muzzle. the chamfer on a gun barrel reamer is to ensure that the last contact between the tool and the barrel blank will not be made with a sharp, scratchy corner. Such a corner could, and probably would, ruin the surface finish of the bore by scratching the dickens out of it. The chamfer is usually made in the form of a straight angle of about 45°, but a simple rounding of the trailing edge will also work quite nicely.

The final surface finish of the hole is also improved by the use of cutting oil during the reaming operation. As with the gundrill that created the initial hole, the oil is pumped through the long shank of the reamer. At the end of the shank, the oil emerges between the cutting flutes and continuously flushes the powder-fine chips away from the cutting edges and out the other end of the barrel. However, unlike

gundrilling, the reaming operation can be accomplished successfully with low oil pressure and flow.

The only requirement is that the chips be flushed away quickly enough to prevent them from interfering with the surface finish produced by the cutting action. Reaming Machines The machines used to ream gun barrels come in two basic types: those which spin the barrel blank and those which spin the reamer. Unlike the gundrilling operation, there is no real advantage that can be assigned to either type of machine.

This is because, while a spinning drill can adversely affect the straightness of the finished hole, a spinning reamer can't affect the concentricity of the bore for better or worse. Reamers are designed to enlarge existing holes, not create a hole where there was none before. Reamers, especially those attached to the end of long, flexible shanks, will tend to "float" in the center of the hole due to a natural tendency to balance the cutting forces on the opposed cutting flutes.

This tendency causes reamers to faithfully follow the course of the original drilled hole whether the reamer is spinning or stationary. This is good news for the barrel maker, because it means that if the bore of a gun barrel is drilled straight, it is very

likely to remain straight during the reaming operation. The downside is that if there are slight imperfections in the straightness of a freshly drilled bore, the defects will not be improved by reaming.

So it's probably best not to bother moving on to the reaming operation at all if there are imperfections in the drilled bore. Gun barrel reamers are typically pulled through the barrel. This means that to setup the machine for reaming, the shank of the reamer is slid through the barrel before being anchored to the carriage that will draw it through the bore.

Since the reamer is pulled through the bore, there is no tendency for the shank of the reamer to bend or flex during machining because the shank is kept under tension by the cutting forces. However, the rotary motion of either the barrel blank or the reamer during the cutting operation will cause torsion forces on the shank of the reamer.

The torsion of the reamer shank can lead to issues with the surface finish of the bore if chatter is induced by the shank loading up under the torsional forces and then releasing them in the form of a quick slip periodically. And despite the fact that pulling the reamer tends to preclude flexing of the shank, whip guides are still normally employed

THE BASICS OF REAMING RIFLE BARRELS CONTINUED

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on reaming machines. The most useful function of the whip guide on a reaming machine is to hold the shank of the reamer on the machine centerline as the reamer exits the bore. This prevents the shank from bowing or bouncing, which could allow the reamer's flutes to be chipped if they were to come into contact with some component of the machine after exiting the barrel.

The cutting speeds used for reaming are considerably lower than those used for gundrilling, especially if the reamer being used is made of highspeed steel rather than carbide. The slower cutting speed allows the cutting flutes of the reamer to remain sharp for a longer period of time. Cutting speeds that are too high could easily lead to a reamer that is dull by the time it makes it to the end of the barrel blank.

This situation must be avoided at all costs, because a dull reamer will not produce a good surface finish. Reamers must be razor sharp to produce atop quality finished surface inside of the bore. Excessively high cutting speeds will also induce chatter during the cut, causing a rough, rather uneven surface finish. This type of defect in a gun barrel is not only unsightly, but it can also cause rapid bore fouling and inaccuracy. So cutting speed is a very important consideration when reaming.

In sharp contrast to the relative cutting speeds used, the feed rate used during reaming is normally quite a bit higher than the feed rate used for gundrilling. The first, and most obvious, reason for the increase in feed rate is the fact that most reamers will have between four and six cutting edges, whereas a gundrill only has one. The feed rate per flute is multiplied by the number of flutes to determine the total rate of feed per minute.

The other major reason that the feed rate can be increased is the fact that, as stated previously, the reamer will follow the existing hole. Gundrill feed rates are intentionally very low so that the drill will have the best possible chance of drilling down the centerline of the barrel blank. This is

not a consideration when reaming. The feed rates used by various barrel makers is quite variable.

Feed rates as low as a few thousandths of an inch per flute per revolution to as high as a few hundredths of an inch have been used successfully. The reason for this leeway in choosing a feed rate is that increasing feed rate does not cause cutting edge wear and erosion to increase nearly as quickly as increasing cutting speed. As long as the cutting speed chosen is properly balanced with the feed rate used, all will be well.

The oil pressure and flow needed to perform a reaming operation are quite a bit lower than the pressure and flow required for the gundrilling operation. When reaming, the chips produced are very fine and are of about the same consistency as grinding dust. Also, the chips do not have to be squeezed out through a narrow V-groove in the shank of the tool. They are carried away from the cutting flutes into the open bore of the barrel where they pass freely out the other end.

As long as the oil pressure is high enough to produce sufficient flow to clear the chips away from the cutting flutes as soon as they are produced, the reaming operation will proceed satisfactorily and produce a good surface finish. Another factor that lowers the requirement for oil pressure and flow during reaming is that fact that very little friction-induced heat is produced during reaming. Drilling produces a lot of friction and heat, and raises the temperature of the oil substantially.

Reaming does not place the same demand for heat removal on the cutting oil, so the rate of flow can be much lower. All of this means that reaming machines do not require nearly as much power at the oil pump as gundrilling machines. Reaming Defects As mentioned previously, reaming cannot influence the straightness or concentricity of the bore for better or worse. So reaming defects come in the form of a rough surface finish.

There are several variables that can, and will, affect the surface finish of the gun barrel's bore. One of the most insidious enemies of a good reamed finish is reamer chatter. There is a phenomenon commonly called roping that is the result of repeated, harmonic chatter. Other potential causes of a rough bore surface are scratching and glazing.

If a particular reamer has produced good bores in the past, then the cause of the bore defect was likely due to some oversight in the initial preparation of the reamer prior to reaming the faulty bore. If the reamer was properly sharpened to razor keenness prior to the reaming operation, then a good first place to check for the cause of the defective bore is the speed and/or feed settings used to make the cut.

If the speed or feed of the cut are not set properly for the materials involved (the chemical composition and hardness of both the reamer and the barrel blank must be considered) it is likely that chatter will be induced or the reamer will become dull before the reaming operation is complete. When the speed of the cut is too fast, it is likely that excessively fast cutting edge erosion will cause the reamer to become dull before the reaming operation is complete. Dull cutting edges can cause the reamer to chatter.

The chatter produces exactly the type of rough, uneven finished surface that it sounds like it would produce. Chatter can also be induced in a sharp reamer with a feed rate that is too high. In this case, the direct cause is likely to be a chip load that the reamer shank is not stiff enough to cope with. If the chip load is too high, it will cause torsion in the shank.

When the force of the torsion finally becomes high enough to resist additional torque, the tension can be released all at once causing the reamer to skip and chatter. There is, however, a potential pitfall associated with a feed rate that is too slow. An excessively slow feed rate can make it more difficult for the

THE BASICS OF REAMING RIFLE BARRELS CONTINUED

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reamer to bite into the material being cut. When this occurs, a condition called glazing is produced. Glazing is basically an excessively burnished finish that causes an excessive rate of cutting edge erosion and heat production. The feed rate must be high enough to allow the cutting flutes to get a good purchase in the barrel walls so that they can cut rather than simply rubbing and basically trying to cold swage the bore to the finished diameter.

And, of course, if the cutting edges become dull too quickly through glazing, this can also cause the reamer to chatter. Sometimes, a peculiar surface finish called roping is seen in a freshly reamed barrel. This condition is caused by repeated, harmonic chatter of the reamer and it leaves chatter marks in the bore in the shape of a spiral. Dull reamers can cause the chatter to begin. The holes produced tend to be polygonal in shape with the number of corners produced be- The Gatling Gun Dr.

Richard Jordan Gatling's gun ushered in anew era of weaponry during the Civil War and his design continues to influence today. In *The Gatling Gun* Peter Smithurst covers the origins, combat record, and lasting influence this pre-Maxim rapid repeater has had. As with all titles from Osprey Publishing (OspreyPublishing.com), this is a fully illustrated history worthy of coffee table status. Gatling was a product of the Yankee ingenuity praised by Alexander Hamilton.

He held a medical degree and was a prolific inventor. While Gatling's invention is influential and important, it is sometimes wrongfully attributed as being the first rapid fire weapon employed. The Ribauldequin, an early volley gun, was first fielded in 1339 and the revolver-like Puckle Gun in 1718. The Mitrailleuse is a multi-barreled volley gun invented by Belgian Army Captain ing directly related to the number of flutes on the reamer.

If the speed, feed, and stiffness of the reamer shank are all just right (or just wrong, depending upon how you look at it) the harmonics of the induced vibration causes the regular repetition of the pattern at ever so slightly different times in the cycle. This produces a spiral pattern as the reamer progresses down the bore. The reamer should definitely be sharpened if roping occurs but the speed and rate of feed may also need to be adjusted to prevent the harmonic vibrations from being produced.

It may also be necessary to attach the reamer to a stiffer shank but this would be a last resort as it requires more time and effort to accomplish. The final defect that may be observed in a reamed bore is a surface finish that is just plain rough. In this case, there will be no corners produced in the hole which would indicate that chatter has occurred. Fafschamps a decade before the advent of the Gatling gun. None of these designs had an ammunition feed mechanism, just multiple, preloaded barrels.

The Ager "Coffee Mill" gun, also known as the Union Repeating Gun, was a single barrel mechanical repeater that used a hopper to feed paper cartridges. While the gun worked, the design problems included breech sealing issues, detonating ammunition in the hopper, and a single barrel. Even at a plodding 100 round per minute pace, forcing seven pounds of lead and burning 7,500 grains of propellant down the bore quickly overheated. Gatling's design was the first to successfully overcome these issues.

Where Gatling's design shines is that it combines a feed mechanism using then-new metallic cartridges with multiple barrels. With a trained crew, the gun was capable of sustained rates of fire over the long term. It wasn't The bore will look nice and round but with a rough and lack-

luster finish rather than be smooth and shiny as it should be. The first thing to check in this instance is the condition of the chamfer on the trailing edges of the cutting flutes.

If there is a sharp corner or a burr on the trailing edge of one or more of the flutes, the bore's surface will show the passage of this imperfection in the form of a definite roughness. If the chamfers are all in good shape the roughness may have been caused by inadequate oil flow. If the cutting oil does not flow with sufficient urgency, then chips can accumulate at the interface between the cutting edges and the barrel's bore.

An accumulation of chips at this interface will prevent the flutes from making a smooth, clean cut and the cutting oil pressure and flow will need to be increased to correct the problem. For more information, refer to *Steel Helix* (steelhelixrifle.com). AG until 1884 with Sir Hiram Stevens Maxim's design did the Gatling have real competition. Even after Maxim and Browning, the Gatling remained in service for many years.

Some historians even argue the Gatling proved more effective than the Colt-Browning M1895 "potato digger" during the Spanish-American War. The hand-cranked Gatling gun continued service in the United States into the Twentieth century with versions produced chambered in .30-03 and .30-06 service cartridges as the M1900 and M1903. The design was declared obsolete by the United States Army by 1911. Decades later the mechanical concept was resurrected and wedded to electricity-driven cranking in the M61 Vulcan.

That cannon has given rise to numerous variations scaled from 5.56mm up to 37mm in various applications. The Gatling Gun is a great history of this design. AG

RIFLES

Quick Detach Sling Mounts In Hollow Synthetic Stocks

A simple and reliable method for installing sling mounts, even in a totally closed and sealed hollow synthetic (plastic) rifle and shotgun butt stock with no access to the inside.

BY RICHARD B. DAVIS NOVEMBER 2015

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Hollow synthetic stocks often do not have enough wall material thickness to reliably mount sling swivels as a wood screw into a conventional wood stock. For those who prefer side mounted rifle slings, the side walls of synthetic butt stocks are often thinner than the bottom edge. Consider commercially available sling mount hardware with hollow stock use.

Uncle Mike's is one of the most common sources and most conventional sling mount hardware comes with a screw/stud having tapered threads, very similar to a wood screw. This attachment is generally not reliable into hollow synthetic stocks which do not have sufficient wall thickness to support the threads. 3/16" wall thickness is not uncommon on the sides of plastic rifle stocks.

QD (Quick Disconnect) sling mounts use a 1/2" diameter cup shaped sling swivel base which can be epoxy glued into a 1/2" diam-

eter hole in a wood rifle stock, often in combination with a small wood screw through the center of the cup for extra strength. The hole in the wood stock is drilled to depth, resulting in the mounted cup being flush with the surface of the stock. This method isn't applicable to hollow synthetic stocks either.

For stocks which do offer interior access by removing the butt-plate or recoil pad, previously successful solutions included use of threaded hardware which, when placed inside of the butt stock, provides a place for screws from the outside to thread into. For thinner stocks, fabrication of a custom plate or mounting fixture has proved successful. This article focuses on the QD swivel base and flush mounting the cup in the side of the butt stock.

Most shooters not already familiar with the advantages of side mounting a sling on rifles and shotguns are usually quickly con-

verted. The principles provided here, with adaptation for any sharp curves, will also work to mount a QD swivel base on the bottom edge of a stock. Our solution is diagrammed with the butt stock end view of a Ruger 10/22. All descriptions in this article assume a right handed shooter, with the sling mounted on the left side of the rifle as viewed from the rear of the butt stock.

When the stock is viewed from the rear, the left side will be facing the neck and cheek of a right handed shooter. There are several key points to note that may not be obvious from the drawing. The interference, or press, fit. The 1/2" nominal diameter hole drilled in the left side of the stock wall is intended to be an interference fit. Many plastics which are used for synthetic stocks appear and behave similar to nylon, delrin, polyethylene and similar plastics when they

QUICK DETACH SLING MOUNTS IN HOLLOW SYNTHETIC STOCKS CONTINUED

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are machined. That means an exact 1/2" hole will shrink after drilling, often several thousandths smaller than the original size. More rigid synthetic materials like conventional fiberglass may not shrink and might "stretch" to accommodate an interference fit. Because this is a press fit and because of plastic shrinkage do not plan on preliminary "dry fit" tests. Disassembly can be done using a press but the ring grooves cut in the exterior of the cup will catch, at the risk of damaging the stock.

Deburr all edges so as not to catch or grab. Postpone drilling the 1/2" hole in the stock as long as possible to minimize time for shrinkage. Another key point is the socket

flush fit at the surface. A spacer the same 1/2" nominal diameter as the sling swivel cup is custom fit to length to provide a flush fit of the cup. Due to the slight contour slope of the stock, the goal is to leave the average of the cup be flush with the stock surface.

It is better to err on the side of leaving a little bit of the cup above the stock surface. Be certain to taper the right end of the spacer. For best mating fit of the spacer to the inside of the stock's right wall, the end of the spacer should be tapered slightly to match the slope and curvature of the stock interior. This will require an "up" indication mark on the cup and spacer combination, combined with careful attention to orientation at assembly time.

Note that rifle stock shapes may not be uniform or symmetrical. Regardless of the material used, this is not uncommon. Surfaces are often not flat, orthogonal or uniform. The next rifle stock for the same make and model of rifle may be a different size and shape. Mounting The Swivel On to the build. Step one, locate the desired sling swivel location. The location I used is good for the small stock of the Ruger 10/22.

I suggest making preliminary measurements with rifle stock and ruler, used both "square with the world." Shim shin-

QUICK DETACH SLING MOUNTS IN HOLLOW SYNTHETIC STOCKS CONTINUED

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gles can hold the stock in a level position and keep it from rocking. Use a Sharpie marker instead of pencil because the marks are more easily removed with solvent. An optional step is to pre-cut a 1/2" round measuring rod. To get the combined length of sling swivel socket and brass spacer it will be necessary to measure inside of the stock. A centering punch slightly under 1/2" diameter and a fine tipped pen work well. A fancier solution is to turn down a piece of brass rod about three inches 1/2" diameter.

The intent is that the Most molded plastic stocks have a mold line that is approximately on center. This mold line can be used to perform a post marking check to confirm that marks on both sides are approximately symmetrical. Wrap a piece of paper over the top of the stock such that the edge of the paper intersects the marked drill points on both sides of the stock. Secure the paper with tape and mark the mold line on top along with both marked drill points. Remove the paper and lay it out on a flat surface.

The distance from center line to each marked drill point on the paper should be about the same. After confirming the marked drill points for the holes to be drilled, mark each with a sharp center punch. Postpone the drilling until you are almost ready to press in the socket/spacer combination. Minimize time for the material to shrink after drilling.

QUICK DETACH SLING MOUNTS IN HOLLOW SYNTHETIC STOCKS CONTINUED

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brass rod will fit nicely through the 1/2" nominal hole cut in the left side of the rifle stock. Next, pre-cut and tap the brass spacer. The brass spacer diameter should exactly match the cup diameter. Round stock "mill size" may be larger than nominal 1/2". Turn down the spacer diameter as needed. Make the brass spacer a little bit over length, about 0.060 or so. Drill and tap 10-32 through the entire length. Deburr and taper edges and holes.

The spacer will be final trimmed to length just before shaping the end for stock contour and press fit installation. Custom fit and trim the 10-32 flat head screw to the inside of the cup. Experience with Uncle Mike's Swivel Base cups shows they work well with #8 machine screws. Use of #10-32 screws as recommended here requires that the screw head be trimmed slightly, both height and diameter, so that absolute full engagement of the male sling swivel insert is achieved.

The male sling swivel insert must go into the cup far enough for the ball detents to fully seat. Otherwise, the sling swivel insert can pull out under load. Confirm that when inserted the male sling swivel has at least some minimal noticeable free play in and out. Now, custom fit and trim the 10-32 screws to length. Using 1/2" nominal length machine screws may not work for a thin stock, such as our project Ruger 10/22. Screw length versus spacer length must be verified and screws shortened accordingly, if needed.

Drill the holes into the rifle stock, using shim shingles and a level to keep the stock "square with the world" while drilling. The holes should be drilled perpendicular to the overall stock shape and not perpendicular to the curved stock surfaces. Study the shape and contour of your stock carefully. Our Ruger stock has a relatively flat surface on the upper half of each side, approximately five degrees from straight up and down.

These nearly flat surfaces, combined with use of an angle meter, helped to shim the stock to be square. Forstner woodworking bits work well in plastic, tending not to wobble and create oversized holes. My Forstner bit measured about 0.003 under 1/2" diameter, perfect for getting an interference press fit. A pilot hole for the Forstner bit is not required. If you do use a pilot hole, keep it very small, much smaller than the centering point of the 1/2" bit. A brad point woodworking bit could be a substitute.

Regular metal cutting drill bits are not recommended this. Masking or painter's tape can protect the stock surface finish, especially for clamping in a vise. For the small opposite (right) side hole, size it for near zero clearance to 10-32 threads. Start with a small pilot hole followed by a 3/16" drill bit. Trim the brass spacer, shape and bring to overall length. Shape the right end of the brass spacer slightly to approximate the curved contour of the rifle stock interior.

Use the round measuring rod or other round stock to determine the trim-to length of the brass spacer. Account for the curved contour at the brass spacer's end. Check the overall combined length of the cup and spacer carefully as you don't have the luxury of a safe dry fit test. Rechamfer the threaded hole in the right end of the spacer if necessary to make it easier to get button head screw started.

After final assembly of the cup and brass spacer and setting with red Loctite (#262 or #271), mark the "up" direction on the edge of the cup and on the flat head screw so that the contoured end of the brass spacer can be properly oriented when the combination is pressed into the rifle stock. Allow the Loctite to cure in case you need to use the flat head screw to rotate the cup and spacer assembly. Press the cup and spacer combination into the stock. Verify mark-

QUICK DETACH SLING MOUNTS IN HOLLOW SYNTHETIC STOCKS CONTINUED

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ings and orient the cup and spacer combination so that the contour on the end of the brass spacer will match the inside contour of the rifle stock. Keep the stock and the end of the cup "square with the world" when pressing. Shim shingles work well to support the stock. If necessary, use an Allen wrench in flat head screw to rotate the cup and spacer combination to align the contoured end of the spacer. Then, repress the cup and spacer combination to confirm it bottomed.

Screw in the 10-32 button head screw on the right side using blue Loctite (#242.) If the hole in the brass spacer does not line up exactly with the small hole in the right side of the stock, use the non pointed end of a centering punch to rock the cup and spacer combination until the hole in the brass spacer exactly aligns with the hole in the rifle stock. Use an Allen wrench in the flat head screw to hold the cup and spacer combination while tightening the button head screw. We're finished.

Expect that the edge surface of the cup will not be uniformly even with the surface of the stock, due to slope and curvature of the stock. Alternative Method There is an alternative method to this build with no screw used on the right side of the stock. Although the small button head screw on the right side of the stock, as used in the above method, is minimally intrusive, some shooters may want to eliminate the need for the screw for appearance purposes.

A solution using glue can be used but the suitability and ability of the glue used to reliably adhere to the synthetic material (plastic) is a big governing factor. Your results may vary. Given the general "slippery" nature of some plastic materials used in synthetic stocks, this author cannot vouch for or guarantee any specific plastic glue. The reader will need to verify that the glue used will adhere to the stock material.

However, Devcon Plastic Welder II (devcon.com, is at the top of our list as a recommendation to try. Try for yourself and confirm the ability of this product to adhere to your stock by gluing to a non-visible portion of the stock. After your confirmation, you may grind off the glued-on experiment. Almost all steps to perform for the glued-in solution are the same as described above with the following exceptions.

First, do not drill the small hole in the opposite (right) side of the stock for the 10-32 button head screw. Threading the brass spacer all the way through is still recommended. The threaded hole will offer a place for the plastic glue to fill into. Second, "rough up" the surfaces where the glue will adhere to, including the inside of the rifle stock (right side) where the brass spacer will seat, the right end of the brass spacer and the right 1/4" of brass spacer.

Cut small grooves in the right end of the brass spacer. Third, just prior to pressing the cup and spacer combination into the stock, apply a liberal amount of plastic glue to the right inside wall of the stock where the brass fitting will "seat" against the right wall. Note that the glued-in solution offers no opportunity for re-work. A glob of glue on the end of the brass spacer would almost certainly prevent removal of the cup and spacer combination. What happens if a the glue joint fails?

Worst case, the sling mount could pull completely out of the butt stock at the most inopportune time, allowing the weapon to fall to the ground or to an unsafe position. The press fit may reduce the risk somewhat. Note that the outside of the sling swivel cup has three grooves cut into the outside of the cup. These grooves are designed to catch and hold for a glued-in installation into a wood stock.

Based on my experience with the press fit of the cup into a plastic stock during removal, when pressing a cup and spacer combination out of a stock the grooves on the outside of the cup tend to catch very firmly on the wall of the rifle stock and make removal of the cup and spacer combination difficult. The grooves caught so firmly that we were surprised this removal did not break the plastic stock.

Based upon this experience, even if the glue joint fails, pulling the sling swivel out of the stock could still be difficult. That said, for reliability, I still recommend using a button head screw on the opposite side outside of the stock to capture and secure the cup and spacer combination. Safety Safety starts with common sense. Always confirm and reconfirm a cleared weapon every time you begin to handle or work with it.

The reader is expected to have an indepth working knowledge of shop practices, including gunsmithing experience. All of the usual disclaimers apply. As we have no control over the execution of these processes, we can assume no liability. Your results may vary. Materials List Berryman B-12 Chemtool (# 0117), available at good auto supply stores, is great for pre-glue cleaning and removal of pen markings. It will attack most wood finishes and many plastics.

Test on an out of sight sample first (berrymanproducts.com, 10-32 x 1/2" Stainless Button Head Screw (length depends on your stock) and 10-32 x 1/2" Stainless Flat Head Screw, Allen socket head (may substitute Phillips head.) I get mine from South Coast Stainless (SouthCoastStainless.com, Uncle Mike's QD Push Button Detachable Swivels #1011-2 (unclemikes.com, Devcon Plastic Welder II for the glue-in solution (devcon.com, G

SHOTGUNS

Tightening Break Open Actions

A vast number of break-open shotguns and some break-open rifles use a single locking lug. Here is how you can tighten loose, wobbly barrels.

BY PAUL MAZAN NOVEMBER 2015

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I have a fascination with old side hammer double-barreled shotguns. They mark a brief point in time when the traditional sidelock of the muzzleloading era and the breechloading era met and were blended into one. Some were inexpensive Belgian-made “hardware store” guns, so called because they could be purchased at the local hardware store by farmers and ranchers at a modest price. Others were works of fine art made by some of the prestigious names in the firearms industry.

In short or- You can see the gap between the barrels and the standing breech, and between the barrels and the water table. der, hammers went internal and the external hammer guns faded from the scene but the method of locking the barrels closed remained. To be sure there are other types of barrel locking methods but this one is very common. I have guns in my collection from makers like Dumoulin & Co., T. C. Montgomery, Remington, E.

James & Co., and American Gun Co. that all use this type of lockup and there are many more. The problem with this locking system is that as the parts wear over years of use. So worn barrels can lock close while leaving a gap between the standing breech and the barrels. Fortunately, the mechanics of this locking system are simple, they have few parts, and this problem is not difficult to fix. The first step is to make certain that the gun is not loaded and then disassemble the gun completely.

Most of these guns are old and in need of a detailed cleaning. Many have broken, cracked, or oil-soaked stocks, so complete disassembly is necessary anyway to really clean the gun and repair any damage. The barrels are locked into the receiver by the locking bolt that ex-

TIGHTENING BREAK OPEN ACTIONS CONTINUED

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The underside of this lug will be thickened by soldering a piece of 0.010 shim stock in place to correct the lockup. Most times the wear will not be this obvious. Tends from the receiver to engage the locking lug under the barrel. It is possible to tighten the lockup by simply peening the locking lug, however, this is a very temporary fix and deforms the lug.

A more lasting repair can be made by simply soldering a piece of shim stock to the engagement surface of the locking bolt.

The next step is to solder the shim to the surface of the lug. Notice the clear twist pattern of the Damascus barrels. For soldering shim stock for this repair I used 0.010 shim stock from Brownells (#080-544-024 AK) and Hi-Force 44 solder (#080-649-001 AK.) After sweating the shim stock to the locking

bolt, allow the part to cool and then trim the shim stock to fit the bolt. You will now need to fit the bolt to the locking lug.

This is done by mating the barrels to the receiver and pushing the locking bolt in place through the receiver. If it slips easily into the locking lug under the barrel, you will have to use thicker shim stock. In most cases the lock-

TIGHTENING BREAK OPEN ACTIONS CONTINUED

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You can start with plain hardware store guns and work on up to the limits of your budget. Although not Damascus, I only shoot black powder shotshells due to its age. ing lug with the 0.010 shim will not go into place. Thin the shim stock soldered to the locking bolt with a fine cut file. Take only a stroke or two off the shim stock and try again. Work slowly and soon the locking lug can be pushed in place in the locking lug stop. Now the gun can be reassembled.

When closed, the barrels should close completely with no horizontal or vertical wiggle. Collecting old hammer guns is a good place for the new collector James and Co. gun was made in England and shows a modest amount of hand engraving on the lock. C. Montgomery is another English shotgun with Damascus barrels, tigerstriped stock, and

modest engraving. Plain or fancy, hammer-guns area mix of technology between the muzzleloading and the cartridge eras. on a budget to start.

They are inexpensive and often need quite a bit of work that the hobbyist can do and learn on. Almost all these old guns will need stock repair, from simple cracks to totally shattered or missing stocks. This gives the novice practical experience in stock repair and refinishing or, in the extreme cases, stock making. I bought the Dumoulin pictured here on Gunbroker.com for \$35 plus shipping. That is not the norm but I rarely pay more than \$200 for one unless it is a Parker or L. C. Smith.

A word of warning is that many of these old guns have Damascus or laminated steel barrels and should be considered dangerous to shoot. If you have an example with good bores they may be safe for use with light blackpowder loads. I have shot all of those I own with no problems but I reload lightly-charged blackpowder loads to use in them. If the barrels are at all questionable use the gun as an inexpensive learning tool.

Fix the problems, repair the stock, learn to checker, learn to reblue and refinish, and hang it on the wall as a decoration. Those old barrels were never made to handle the pressure curve of even the lightest smokeless powder loads. DO NOT USE ANY SMOKELESS POWDER LOAD in these guns no matter how mild. It simply is not worth the risk. AG

PEOPLE & COMPANIES

A Tale Of Two Cylinders

A conversion cylinder of a different caliber increases the flexibility of a single action revolver.

BY ROY SEIFERT NOVEMBER 2015

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Some time ago, my cowboy action shooting friend “Chili Ron” showed me a stainlesssteel large-frame Ruger Vaquero that came with two cylinders; one in .45 LC (Long Colt), and a second one in .45 ACP (Automatic Colt Pistol.) I thought that was a great idea as I’m a big fan of convertible revolvers because of the additional flexibility of being able to use different cartridges.

I own two Ruger Single Six convertible revolvers that each came with two cylinders; one for .22 short/long/long rifle, and a second for .22 Magnum. I thought it would be fun to shoot .45 ACP out of my Ruger large-frame .45 LC Vaqueros, not to mention the lighter rounds would be good for cowboy action shooting. .45 ACP is the cartridge used for Wild Bunch matches in 1911 pistols. It’s worth noting that not all cylinders are alike.

I purchased two .45 ACP cylinders found on e Bay that were advertised as having come from old-model Blackhawks. I can’t help but wonder what happened to the original revolver and how the cylinder became separated from it. When I started this project I made a rash assumption—and we all know what happens when we make assumptions. I had assumed that all Ruger cylinders were manufactured to the same specification.

Perhaps I didn’t hear the game-show buzzer going off indicating I had guessed incorrectly but my two new cylinders were

as different as night and day. Both chambered .45 ACP cartridges, were fluted, and came from Ruger single action revolvers, however, that’s about where the similarities ended. The first cylinder I purchased, which I called cylinder #1, came in a red felt bag as originally provided by Ruger. The problem with these bags is they absorb moisture.

Most people never removed the spare cylinder from the bag and the cylinder eventually develops rust. This cylinder had almost no bluing left and had plenty of rust spots from being stored in the felt bag. In case you’re wondering, I did not save the red bag because it had too many holes in it where it touched the cylinder, causing rust. This cylinder had been fired at one time and was stored without being cleaned. It measured 0.740 inches in length and the ratchet measured 0.611 inches in diameter.

The rim of a dummy cartridge set flush with the rear face of this cylinder. Cylinder #2 was in pristine condition, cleaned and all of the bluing was intact. I knew it had been installed in a revolver at one time because it had the drag ring caused by the cylinder latch. To my surprise this cylinder was shorter; it measured 0.700" long and the ratchet measured 0.577". When I inserted a dummy cartridge the cylinder on the right is pristine.

Notice how the rim of a dummy cartridge is sitting above the right cylinder’s face. Into one of the chambers, the rim was exposed, sitting above the rear face of the cylinder.

Milling The Cylinders I wanted both cylinders to be the same as the original .45 LC cylinders that came with my two Vaqueros. I measured the original cylinders and found they measured 0.700" in length and their ratchets measured 0.560" in diameter.

This meant that I would need to reduce the diameter of the ratchet of each new cylinder and reduce the length of cylinder #1 by 0.040". I measured the gas ring of each new cylinder and they both measured 0.435" wide by 0.095" high, so I milled a 0.436 hole 0.200 deep in a piece of aluminum mounted to my older MAXNC-10CL (maxnc.net) hobby CNC mill. I then drilled and tapped a 1/4-20 hole in the center of this hole.

I placed a piece of 1/4-20 threaded rod through the pivot hole of cylinder #1 and screwed the rod into the threaded hole. I installed a 1/4-20 nut onto the threaded rod to hold the cylinder in place. Using a 1/4" square-end milling bit, I programmed the CNC mill to reduce the diameter of the ratchet and mill the rear face of the cylinder. I used the same program to reduce the diameter of the ratchet of cylinder #2, but because this cylinder was already the proper length, no metal was removed from the rear face.

End Shake Both cylinders had end shake issues. Cylinder #1 had an end shake gap of 0.030" and cylinder #2 had an

A TALE OF TWO CYLINDERS CONTINUED

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This could cause the cylinder to rub against the rear face of the barrel and induce misfires due to the primer moving away from the firing pin. end shake gap of 0.014. Excessive end shake causes the cylinder to move forward and rub against the rear of the barrel and can induce misfires by the primer moving away from the firing pin. End shake can easily be corrected by installing an end shake shim.

Brownells sells a 10-pak of 0.0045" Single Action Revolver Gas Ring Shims (#713-000-080) which I could have stacked to fit. Since I have a CNC mill I fabricated my own using a piece of 3/64 tool steel. I milled the two end shake shims I needed I used Super Glue Gel to attach it to the front of the cylinder. 0.436"

in diameter with a center hole of 0.270". I installed the 0.030" shim onto the front of cylinder #1 and the 0.014" shim onto the front of cylinder #2.

I used Super Glue Gel to hold the shims in place so I don't have to worry about losing them when removing the cylinder. Refinishing Cylinder #1 I am a big fan of cold-bluing. I have done complete receivers with cold blue solutions and they have come out looking very nice. After reducing the diameter of the ratchet of cylinder #2 I cold-blued it to protect the exposed metal. For cylinder #1 I wanted to try a different process using Brownells Dicropan IM.

Rather than using hot bluing salts and a single dip process, Dicropan IM is a slower rust-bluing process that requires multiple repeat dipping and carding.

Brownells sells a complete Dicropan IM bluing kit (#082-905-105) but I already had most of the components, so I purchased just what I needed: One quart of Dicropan IM (#082-008-032), 400-grit polishing compound (#080-505-400), and a soft stainless steel wire wheel (#360-164-631.) The wire wheel is used to brush off the surface rust ("carding") caused by the rust-bluing process. The Dicropan IM instructions say to use degreased steel wool for the carding process, but the wire wheel will helped card the front

FINISHING

Reader Forum

BY AMERICAN GUNSMITH EDITORS NOVEMBER 2015

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I applied 12 more coats of Dicropan IM. After applying each coat I boiled the cylinder for five minutes, removed it from the water, shook off the excess water, and allowed it to air dry. After the cylinder dried it had a white coating which I carded off with a second degreased pad of 000 steel wool. It took nine coats before the cylinder started to take on a darker color, so I did four more applications to get the nice dark color I was looking for.

I soaked the cylinder in a water-displacing oil overnight to allow the bluing to cure. The only way I could tell the Dicropan IM-blued cylinder from the factory-blued

cylinder was the newly finished cylinder did not have a drag ring caused by the cylinder latch. To finish the job I took an electric engraver and engraved the last three digits of the Vaquero's serial number on the front face of each cylinder similar to the way Ruger does at the factory so I can tell which cylinder goes with which gun.

I have now doubled the versatility of my two .45 LC Vaqueros by providing a .45 ACP conversion cylinder for each one, and hopefully increased the value of each revolver as well. AG

READER FORUM CONTINUED

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Remington Trigger Issue M. H. Walker, codesigner of the Walker-Haskell trigger used by Remington, acknowledged as early as 1947 that his design was flawed after receiving reports of unintentional discharges from a select group of shooters given pre-production rifles equipped with the new trigger for testing. After confirming the flaw in his design, he wrote a memo to his superiors suggesting with a hand-drawn diagram to implement a simple fix for the fire on safety release issue, the most common of the reports.

He recognized the displacement of the connector as being the cause of the unintentional discharges and suggested a manual reset of the connector utilizing the action of the safety when placed in the safe position. The manual reset that he recommended in 1947 was designed into the X-Mark Pro trigger in 2007, sixty years later. More about this can be read in a report authored by Jack Belk, *Unsafe By Design: Forensic Gunsmithing and Firearms Accident Investigations* (independent.academia.edu/JBelk).

Jim Corolewski Ramsey Gunsmithing RK Campbell responds. In spite of some criticisms, the Remington trigger has served sportsmen, police and military well for many years. This doesn't mean the system is perfect or infallible. All of the injuries with the rifle came from unsafe handling, just as injury with the Glock and 1911 come from unsafe handling. It is litigious society that is the real problem. Certainly of the millions made some had problems.

The Remington can be maladjusted and made dangerous, but it is as good a product as most and better than some. I guess it's too bad Carlos Hathcock is no longer around to ask! Remington 51 Pistol I recently came across a Remington 51 pistol in non-collectible condition and thought I would try to figure out how it works and

investigate improving the trigger pull. As presented to me, the trigger pull was heavy and rough, with several "grabby" spots.

I found a bit of disassembly/assembly help from the Internet and managed to completely disassemble and clean the pistol, leading to my questions. Has American Gunsmith ever done an article on the Remington 51? Why does the sear lock lever, which prevents the hammer from falling when the magazine is removed, have two holes drilled in it? One is for the pin which holds it in place. What is the purpose of the other hole? Can this lever be left out if I preferred the capability of firing without a magazine in place?

What is the best order of reassembly for the action components (hammer, sear, disconnector)? What components need to be polished to lighten and smooth the trigger pull? The trigger spring inside the body of the trigger seems to be the primary contributor to pull weight. Are there any cautions about shortening this spring? Yes, we have previously covered the Model 51 in August 2005. If you managed to find how to disassemble the pistol, you should reverse those steps to reassemble it.

No, do not remove the sear lock lever. Your task is to reduce friction, a common practice followed by police armorers when the officers in their respective departments complain of overly heavy trigger pulls in duty weapons. You have already partially experienced the result of friction reduction. While it actually doesn't lighten a pull to a point where misfires are possible, it makes the trigger feel lighter because it operates more smoothly. Gun Digest publishes a book of handgun schematics.

Buy it and refer to it as we take you through a thorough polishing job. Underscore "polishing." You don't want to remove so much metal from a pin, for ex-

ample, that it subsequently no longer serves its purpose of holding components together. Having a schematic handy will make the following directions readily understandable.

Polish the stem of the sear lock, the main-spring strut, the sear lock lever pin, the sear lock pin, the sides of the trigger bow, the trigger bow recesses in the grip frame, the inner surface of the recoil spring bushing, the side surfaces of the hammer, disconnector and sear, and the inner surface of the mainspring. Now check the interior of the frame in areas that come into contact with the polished parts. Lightly touch up any rough spots or signs of rubbing.

We see no trigger spring within the trigger on our schematic. If we did, we'd strongly advise it not be cut. The same is true of the mainspring. Instead, contact Wolff Springs (gunsprings.com, to see if they have lighter ones for the Model 51. Remember, the 51 in .32 ACP or .380 can rightfully be considered among the ancestors to modern personal defense pistols. A target gun it ain't and never was.

Steve Johnson Winchester Model 100 I have a Winchester Model 100 in .308 that was brought in with the complaint of fired cases sticking in the chamber. After thoroughly cleaning the chamber fired cases slip in and out freely but upon firing the empty cases remain loose in the receiver causing a jam. The ejectors seem to have plenty of tension, so I removed the extractor (which felt gritty) and cleaned/lubed it. It still feels a little gritty but now will stovepipe the spent round.

Is it possible the extractor was damaged when the cases were sticking in the chamber or is there something else I'm overlooking? Bart Holland Point one: If the owner has disassembled the rifle, failure to reassemble the gas system properly may have re-

READER FORUM CONTINUED

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sulted. See The Official NRA Guide To Firearms Assembly for details. Point two: Is reloaded ammunition being used? Ammo failing to equal factory specifications for internal ballistic performance, otherwise known as weak fodder, frequently causes short cycling in a Model 100. Your mention of stove piping leads us to suspect the presence of ammunition less powerful than factory cartridges is involved.

Point three: Regardless of how the ejector(s) seem to be, replacement may be needed after all else mentioned here has been eliminated. Ithaca Hammerless I am in need of the reassembly procedures for Ithaca's hammerless double barrel shotgun. I have called Ithaca Gun Company directly and they said it was a 1903 but has no idea how to reassemble the gun. It came out before they started using coil springs. We think what you have is a Lewis Model. If it is further identified as "1 Special" it has Nitro Steel barrels.

Serial number range for the Lewis Model was 55000 to 1236000. There likely isn't away to obtain a schematic or owner's manual. Contact Brownells Technical Services tech@brownells.com to see if they can lead you to a gunsmith aged enough to be familiar with a Lewis. Stripping Stock What can I use to strip a Remington 700 stock? I tried two strippers, which loosens things up slightly, then smears all over the stock. I can't get the old finish out of the checkering.

Before plunging blindly ahead with advice, we'd need to know what was applied to finish off the stock at the factory. Contact Remington Customer Service and provide the model and serial number of the rifle. Ask them to identify the finish coat on your rifle stock, about the stock finish, and the best solvent to remove it. Ask if this solvent would have a bad effect on the underlying wood. It may require more than one application of the stripper to accomplish this.

Purchase anew stiff bristle toothbrush and have it standing by to clean out checkering. All remaining stripper residue must be removed from the stock before application of anew finish. Gary Jones Bluing Cana matte gun blue finish be made glossy? Vice versa? Should internal action parts be blued? I'm especially thinking about parts that need a high degree of polish for smooth operation. I could polish the parts very smooth before bluing, but does the bluing process then roughen that polished surface?

Steve Johnson Yes, if you remove all existing finish, highly polish the bare metal. degrease and reblue. Vice versa is the same conversion without the base metal polishing. Could be that a light application of clear, matte finish Dura Coat will dull things down enough to suit you. No, just polish and clean. Bluing will only roughen the polished surface when the substrate is rough or has somehow become rough in the process of application. M1 Garand I have a new stock for an M1 and can't get the upper handguard off.

It seems I need to do something with the gas tube (slide forward) to clear the band. Any help would be greatly appreciated as that part of disassembly is not in any of my manuals. Rich Lee Kelly Davis Start with a dull screwdriver and a block of soft wood. The screwdriver is used to back out the gas cylinder lock screw, after which you unscrew and remove the gas cylinder lock and begin removal of the cylinder by lightly tapping on the bayonet mount with the wooden block.

Note, on Garands with modified gas cylinders, the modification shows up as a cut from the front sight to the lower splines. On these rifles, the front sight screw must be loosened prior to moving the gas cylinder forward. Failure to do so may damage both the cylinder and the barrel. AG

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